

# Porth's Pathophysiology Concepts of Altered Health 10th Edition Test Bank

## Chapter 1- Concepts of Health and Disease

1. At an international nursing conference, many discussions and breakout sessions focused on the World Health Organization (WHO) views on health. Of the following comments made by nurses during a discussion session, which statements would be considered a good representation of the WHO definition? Select all that apply.
  - A) Interests in keeping the elderly population engaged in such activities as book reviews and word games during social time
  - B) Increase in the number of chair aerobics classes provided in the skilled care facilities
  - C) Interventions geared toward keeping the elderly population diagnosed with diabetes mellitus under tight blood glucose control by providing in-home cooking classes
  - D) Providing transportation for renal dialysis patients to and from their hemodialysis sessions
  - E) Providing handwashing teaching sessions to a group of young children

Ans: A, B, C, E

### Feedback:

The WHO definition of health is defined as “a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity.” Engaging in book reviews facilitates mental and social well-being; chair aerobics helps facilitate physical well-being; and assisting with tight control of diabetes helps with facilitating physical well-being even though the person has a chronic disease. Handwashing is vital in the prevention of disease and spread of germs.

2. A community health nurse is teaching a group of recent graduates about the large variety of factors that influence an individual's health or lack thereof. The nurse is referring to the *Healthy People 2020* report from the U.S. Department of Health and Human Services as a teaching example. Of the following aspects discussed, which would be considered a determinant of health that is outside the focus of this report?
  - A) The client has a diverse background by being of Asian and Native American descent and practices various alternative therapies to minimize effects of stress.
  - B) The client has a family history of cardiovascular disease related to hypercholesterolemia and remains noncompliant with the treatment regime.
  - C) The client has a good career with exceptional preventative health care benefits.
  - D) The client lives in an affluent, clean, suburban community with access to many health care facilities.

Ans: B

### Feedback:

In *Healthy People 2020*, the focus is to promote good health to all (such as using alternative therapies to minimize effects of stress); achieving health equity and promoting health for all (which includes having good health care benefits); and promoting good health (which includes living in a clean community with good access to health care). A client's noncompliance with treatments to control high cholesterol levels within the presence of a family history of CV disease does not meet the “attaining lives free of preventable disease and premature death” determinant.

3. A physician is providing care for a number of patients on a medical unit of a large, university hospital. The physician is discussing with a colleague the differentiation between diseases that are caused by abnormal molecules and diseases that cause disease. Which of the following patients most clearly demonstrates the consequences of molecules that cause disease?
- A) A 31-year-old woman with sickle cell anemia who is receiving a transfusion of packed red blood cells
  - B) A 91-year-old woman who has experienced an ischemic stroke resulting from familial hypercholesterolemia
  - C) A 19-year-old man with exacerbation of his cystic fibrosis requiring oxygen therapy and chest physiotherapy
  - D) A 30-year-old homeless man who has *Pneumocystis carinii* pneumonia (PCP) and is HIV positive.

Ans: D

**Feedback:**

PCP is an example of the effect of a molecule that directly contributes to disease. Sickle cell anemia, familial hypercholesterolemia, and cystic fibrosis are all examples of the effects of abnormal molecules.

4. A member of the health care team is researching the etiology and pathogenesis of a number of clients who are under his care in a hospital context. Which of the following aspects of clients' situations best characterizes pathogenesis rather than etiology?
- A) A client who has been exposed to the *Mycobacterium tuberculosis* bacterium
  - B) A client who has increasing serum ammonia levels due to liver cirrhosis
  - C) A client who was admitted with the effects of methyl alcohol poisoning
  - D) A client with multiple skeletal injuries secondary to a motor vehicle accident

Ans: B

**Feedback:**

Pathogenesis refers to the progressive and evolutionary course of disease, such as the increasing ammonia levels that accompany liver disease. Bacteria, poisons, and traumatic injuries are examples of etiologic factors.

5. A new myocardial infarction patient requiring angioplasty and stent placement has arrived to his first cardiac rehabilitation appointment. In this first session, a review of the pathogenesis of coronary artery disease is addressed. Which statement by the patient verifies to the nurse that he has understood the nurse's teachings about coronary artery disease?
- A) "All I have to do is stop smoking, and then I won't have any more heart attacks."
  - B) "My artery was clogged by fat, so I will need to stop eating fatty foods like French fries every day."
  - C) "Sounds like this began because of inflammation inside my artery that made it easy to form fatty streaks, which lead to my clogged artery."
  - D) "If I do not exercise regularly to get my heart rate up, blood pools in the veins causing a clot that stops blood flow to the muscle, and I will have a heart attack."

Ans: C

**Feedback:**

The true etiology/cause of coronary artery disease (CAD) is unknown; however, the pathogenesis of the disorder relates to the progression of the inflammatory process from a fatty streak to the occlusive vessel lesion seen in people with coronary artery disease. Risk factors for CAD revolve around cigarette smoking, diet high in fat, and lack of exercise.

6. A 77-year-old man is a hospital inpatient admitted for exacerbation of his chronic obstructive pulmonary disease (COPD), and a respiratory therapist (RT) is assessing the client for the first time. Which of the following aspects of the patient's current state of health would be best characterized as a symptom rather than a sign?
- A) The patient's oxygen saturation is 83% by pulse oxymetry.
  - B) The patient notes that he has increased work of breathing when lying supine.
  - C) The RT hears diminished breath sounds to the patient's lower lung fields bilaterally.
  - D) The patient's respiratory rate is 31 breaths/minute.

Ans: B

**Feedback:**

Symptoms are subjective complaints by the person experiencing the health problem, such as complaints of breathing difficulty. Oxygen levels, listening to breath sounds, and respiratory rate are all objective, observable signs of disease.

7. Which of the following situations would be classified as a complication of a disease or outcome from the treatment regimen? Select all that apply.
- A) Massive pulmonary emboli following diagnosis of new-onset atrial fibrillation
  - B) Burning, intense incision pain following surgery to remove a portion of colon due to intestinal aganglionosis
  - C) Development of pulmonary fibrosis following treatment with bleomycin, an antibiotic chemotherapy agent used in treatment of lymphoma
  - D) Gradual deterioration in ability to walk unassisted for a patient diagnosed with Parkinson disease
  - E) Loss of short-term memory in a patient diagnosed with Alzheimer disease

Ans: A, C

**Feedback:**

Development of pulmonary emboli and pulmonary fibrosis following chemotherapy are both examples of a complication (adverse extensions of a disease or outcome from treatment). It is normal to expect incisional pain following surgery. As Parkinson disease progresses, the inability to walk independently is expected. This is a normal progression for people diagnosed with Parkinson's. Loss of short-term memory in a patient diagnosed with Alzheimer disease is an expected finding.

8. Laboratory testing is ordered for a male patient during a clinic visit for a routine follow-up assessment of hypertension. When interpreting lab values, the nurse knows that
- A) a normal value represents the test results that fall within the bell curve.
  - B) if the lab result is above the 50% distribution, the result is considered elevated.
  - C) all lab values are adjusted for gender and weight.
  - D) if the result of a very sensitive test is negative, that does not mean the person is disease free.

Ans: A

**Feedback:**

What is termed a normal value for a laboratory test is established statistically from results obtained from a selected sample of people. A normal value represents the test results that fall within the bell curve or the 95% distribution. Some lab values (like hemoglobin) are adjusted for gender, other comorbidities, or age. If the result of a very sensitive test is negative, it tells us the person does not have the disease, and the disease has been ruled out or excluded.

9. The laboratory technologists are discussing a new blood test that helps establish a differential diagnosis between shortness of breath with a cardiac etiology and shortness of breath with a respiratory/pulmonary etiology. A positive result is purported to indicate a cardiac etiology. The marketers of the test report that 99.8% of patients who have confirmed cardiac etiologies test positive in the test. However, 1.3% of patients who do not have cardiac etiologies for their shortness of breath also test positive. Which of the following statements best characterizes this blood test?

A) Low validity; high reliability  
B) High sensitivity; low specificity  
C) High specificity; low reliability  
D) High sensitivity; low reliability

Ans: B

**Feedback:**

A large number of patients would receive the correct positive diagnosis (high sensitivity), while a significant number would receive a false-positive diagnosis (low specificity). The information given does not indicate low reliability or low validity.

10. As part of a screening program for prostate cancer, men at a senior citizens' center are having their blood levels of prostate-specific antigen (PSA) measured. Which of the following statements would best characterize a high positive predictive value but a low negative predictive value for this screening test?

A) All of the men who had high PSA levels developed prostate cancer; several men who had low PSA levels also developed prostate cancer.  
B) All of the men who had low PSA levels were cancer-free; several men who had high levels also remained free of prostate cancer.  
C) Men who had low PSA levels also displayed false-positive results for prostate cancer; men with high levels were often falsely diagnosed with prostate cancer.  
D) The test displayed low sensitivity but high specificity.

Ans: A

**Feedback:**

The test's inability to rule out cancer with a low PSA level indicates a low negative predictive value. Answer B suggests a high negative predictive value, while answer C indicates a low positive predictive value. High positive predictive value is associated with high sensitivity.

11. A male international business traveler has returned from a trip to Indonesia. While there, he hired a prostitute for companionship and engaged in unprotected sex on more than one occasion. Unbeknownst to him, this prostitute harbored the hepatitis C virus. Upon return to the United States, he exhibited no symptoms and returned to his usual activities. During this period of no outward symptoms, the man would be classified as being in
- A) the preclinical stage of disease.
  - B) remission and unlikely to develop hepatitis C.
  - C) the clinical disease stage of hepatitis C.
  - D) the chronic phase of hepatitis C.

Ans: A

**Feedback:**

During the preclinical stage, the disease is not clinically evident but is destined to progress to clinical disease.

12. As of November 1, 2012, there were a total of 10 confirmed cases of Hantavirus infection in people who were recent visitors (mid-June to end of August, 2012) to Yosemite National Park. Three visitors with confirmed cases died. Health officials believe that 9 out of the 10 people with Hantavirus were exposed while staying in Curry Village in the Signature Tent Cabins. This is an example of
- A) what the anticipated mortality rate would be if a family of five were planning to vacation in Yosemite National Park.
  - B) the prevalence of Hantavirus one can anticipate if he or she is going to vacation in Yosemite National Park.
  - C) the low rate of morbidity one can expect while traveling to Yosemite National Park.
  - D) the incidence of people who are at risk for developing Hantavirus while staying in Yosemite National Park.

Ans: D

**Feedback:**

The incidence reflects the number of new cases arising in a population at risk during a specified time.

13. A particular disease has a debilitating effect on the ability of sufferers to perform their activities of daily living and is a significant cause of decreased quality of life. However, few people die as a result of the disease's direct effects. There are hundreds of thousands of Americans living with the disease but relatively few new cases in recent years. Which of the following statements best conveys an accurate epidemiological characterization of the disease?
- A) Low mortality; high morbidity; low prevalence; high incidence
  - B) Low mortality; high morbidity; high incidence; low prevalence
  - C) High mortality; low morbidity; high incidence; low prevalence
  - D) High morbidity; low mortality; high prevalence, low incidence

Ans: D

**Feedback:**

Morbidity is associated with quality of life, while mortality is indicative of causation of death. In this case, morbidity is high and mortality is low. Prevalence refers to the number of cases present in a population, while incidence refers to the number of new cases. In this case, prevalence is high, while incidence is low.

14. An epidemiologist is conducting a program of research aimed at identifying factors associated with incidence and prevalence of congenital cardiac defects in infants. The researcher has recruited a large number of mothers whose infants were born with cardiac defects as well as mothers whose infants were born with healthy hearts. The researcher is comparing the nutritional habits of all the mothers while their babies were in utero. Which of the following types of study is the epidemiologist most likely conducting?
- A) Cohort study
  - B) Cross-sectional study
  - C) Case-control study
  - D) Risk factor study

Ans: C

**Feedback:**

In this study, the mothers with cardiac-affected babies would be the case group, while the mothers of healthy infants would serve as a control. This study does not possess the characteristics of a cohort or cross-sectional study, and risk factor study is not an existing methodology.

15. A nurse practitioner is working in a crowded neighborhood where the population is primarily immigrants from China. The nurse has designed a research study to follow children from kindergarten to the age of 25. She is going to be looking at their diet, successful progression in school, health practices, and development of disease, to name a few items. This type of research is known as

A) cohort study.  
B) cross-sectional study.  
C) case-control study.  
D) epidemiological study.

Ans: A

**Feedback:**

In this cohort study, a group of people who were born at approximately the same time or share some characteristics of interest is the focus of the research. This study does not possess the characteristics of a case-control or cross-sectional study, and epidemiological study is not an existing methodology.

16. As part of a community class, student nurses are developing a class to teach expectant parents the importance of having their child properly secured in a child safety seat. During the class, the students are going to have a safety officer examine the car seats that the parents have installed in their vehicles. This is an example of which type of prevention?

A) Primary prevention  
B) Secondary prevention  
C) Tertiary prevention  
D) Prognosis enhancement

Ans: A

**Feedback:**

Primary prevention is directed at keeping disease from occurring by removing risk factors. Some primary prevention is mandated by law, like child safety seats. Secondary prevention focuses on screening and early disease identification, whereas tertiary prevention is directed at interventions to prevent complications of a disease.



17. A multidisciplinary health care team operates a program aimed at the prevention, identification, and treatment of diabetes on a large Indian reservation. Which of the following aspects of the program would be most likely to be classified as secondary prevention?
- A) Regularly scheduled wound dressing changes for clients who have foot ulcers secondary to peripheral neuropathy and impaired wound healing
  - B) Teaching school children how a nutritious, traditional diet can lessen their chances of developing adult-onset diabetes
  - C) Staffing a booth where community residents who are attending a baseball tournament can have their blood glucose levels checked
  - D) Administering oral antihyperglycemic medications to clients who have a diagnosis of diabetes

Ans: C

**Feedback:**

Secondary prevention focuses on screening and early disease identification, such as checking the blood glucose levels of a large number of individuals to identify potential cases of diabetes. Wound treatment and medication administration would be considered tertiary interventions, and education would be considered primary prevention.

18. An occupational therapist conducts a group therapy program called MindWorks with older adults who have diagnoses of dementia and Alzheimer disease. The goal of the group is to slow the cognitive decline of clients by engaging them in regular, organized mental activity such as reading maps and solving puzzles. How would the program most likely be characterized?
- A) Primary prevention
  - B) Secondary prevention
  - C) Tertiary prevention
  - D) Prognosis enhancement

Ans: C

**Feedback:**

Interventions aimed at slowing the course of an already-diagnosed disease characterize tertiary prevention.

19. The clinical educator of a hospital medical unit has the mandate of establishing evidence-based practice guidelines for the nursing care on the unit. Which of the following statements most accurately captures a guiding principle of the nurse's task?
- A) Evidence-based practice guidelines will be rooted in research rather than nurses' subjective practice preferences and experiences.
  - B) Guidelines are synonymous with systematic research reviews.
  - C) The need for continuity and standardization of guidelines will mean that they will be fixed rather than changeable.
  - D) The guidelines will combine individual expertise with external systematic evidence.

Ans: D

**Feedback:**

Evidence-based guidelines are a result of the combination of empirical, published evidence and the expertise of accomplished practitioners. They are not the same as systematic reviews of the literature, and they are fluid and modifiable in the face of new evidence.

20. The neuroscience nursing unit has developed a set of step-by-step directions of what should occur if a nursing assessment reveals that the patient may be exhibiting clinical manifestations of a cerebrovascular accident (CVA). Which of the following statements about clinical practice guidelines are accurate? Select all that apply.
- A) Step-by-step guidelines are usually developed and based primarily on “how it has always been done before.”
  - B) The development of evidence-based practice guidelines requires a research review from different studies to develop the most accurate diagnostic method to implement.
  - C) Once developed, practice guidelines only need to be reviewed if a national committee sends out an update on new research.
  - D) When developing a CVA set of step-by-step directions, the nursing unit should ask for assistance from experts in the neuroscience field. The potential users of the guidelines should pilot test it for further feedback.
  - E) A meta-analysis could be utilized to combine evidence from different studies to produce a more accurate diagnostic method.

Ans: B, D, E

**Feedback:**

Clinical practice guidelines are systematically developed and intended to inform practitioners in making decisions about health care for CVA patients. They should be developed using research and review by experts in the clinical content. Potential users should also participate and provide feedback prior to implementation. The purpose of the guidelines is to review EBP articles and develop new practice guidelines rather than continuing practicing primarily on “how it has always been done before.” Once developed, the guidelines must be continually reviewed and changed to keep pace with new research findings. A meta-analysis could be utilized to combine evidence from different studies to produce a more accurate diagnostic method or the effects of an intervention method.

## Chapter 2- Cell and Tissue Characteristics

1. During a discussion on cellular components and their function, a student asked the instructor the purpose of messenger RNA (mRNA). Of the following, which is the most accurate answer?
  - A) Transports amino acids to the site of protein synthesis
  - B) Acts as an inner nuclear support membrane for a rigid network of protein filaments that bind DNA to the nucleus
  - C) Performs an active role of protein synthesis, where mRNA molecules direct the assembly of proteins on ribosomes to the cytoplasm
  - D) Assists cells in forming neoplastic progression by altering the response of chromatin in the nuclear matrix

Ans: C

**Feedback:**

The nucleus is the site for the synthesis of three types of RNA that move to the cytoplasm and carry out the actual synthesis of proteins. Messenger RNA copies and carries the DNA instructions for protein synthesis to the cytoplasm. Ribosomal RNA is the site of actual protein synthesis; transfer RNA transports amino acids to the site of protein synthesis.

2. The nurse is providing care for a client with a diagnosis of cirrhosis, and she notes that the client's sclerae are jaundiced. The nurse recalls that jaundice is a pigment that can accumulate in which part of the cell?
  - A) Nucleus
  - B) Cytoplasm
  - C) Golgi apparatus
  - D) Rough endoplasmic reticulum (ER)

Ans: B

**Feedback:**

Pigments such as bilirubin and melanin can accumulate in the cytoplasm, resulting in the characteristic yellow skin tones associated with jaundice. Pigments do not tend to accumulate in the nucleus, Golgi apparatus, or rough ER.

3. A 14-year-old female has been experiencing severe internal cramps in the region of the pelvis and weight loss. She has been admitted with rectal bleeding. The physician has diagnosed her with inflammatory bowel disease (IBD). She asks the nurse what causes this disease. The nurse will base her response knowing that IBD has been linked to
- A) liver involvement in faulty glycogen stores.
  - B) endoplasmic reticulum stress in the gastrointestinal system.
  - C) oversecretion of insulin from the beta cells in the pancreas.
  - D) infiltration of the gastrointestinal tract by bacterial toxins.

Ans: B

**Feedback:**

Researchers are determining links between the endoplasmic reticulum (ER) and various disease processes. For examples, ER stress in the GI system has been found to be related to intestinal inflammations such as those occur with inflammatory bowel disease. The smooth ER of the liver is involved in glycogen stores. Insulin is synthesized as a large, inactive proinsulin molecule cut apart to produce a smaller, active insulin molecule within the Golgi complex of the beta cells. Bacterial toxins have exploited the retrograde transport mechanism.

4. A professor is teaching a group of students about the role of mitochondria within the cell. Which of the following statements is true of mitochondria?
- A) They are the site of adenosine triphosphate (ATP) production.
  - B) The number of mitochondria in a cell is equal to the number of nuclei.
  - C) They are replicated within the smooth endoplasmic reticulum (ER).
  - D) Mitochondrial DNA is inherited patrilineally.

Ans: A

**Feedback:**

Consistent with their characterization as the “power plants” of the cell, mitochondria are the site of ATP synthesis for the cell. The number of mitochondria in a given cell type varies, according to the energy demands of the particular cell. They are self-replicating rather than being produced in the smooth ER, and they are inherited matrilineally.

5. A patient has been diagnosed with a neurodegenerative disease called multiple sclerosis (MS). The physician explains to the patient that this disease may be caused by dysregulated apoptosis. Later that day, the patient asks the nurse what this means. The nurse should reply,
- A) "The cells around your nerves don't know how to die correctly."
  - B) "The cytoplasm should neutralize the various apoptotic inhibitors but isn't working correctly."
  - C) "Dysregulated apoptosis has caused an excessive rate of programmed cell death along the neuropathways."
  - D) "There is an inappropriately low rate of apoptosis occurring within the cells."

Ans: C

**Feedback:**

Dysregulated apoptosis can mean too little or too much and has been implicated in neurodegenerative diseases, in which there is an increased or excessive rate of apoptosis.

6. A patient experiencing *immotile cilia syndrome* should be frequently assessed by the nurse for which priority complication?
- A) Epistaxis resulting from loss of cilia in the nasal passageway
  - B) Bronchiectasis due to interferences with clearance of inhaled bacteria along the respiratory tract
  - C) Sterility caused by inability of the sperm to swim downstream
  - D) Inability to hear soft sounds related to kinocilium on the hair cells in the inner ear

Ans: B

**Feedback:**

*Immotile cilia syndrome* immobilizes the cilia of the respiratory tract, thus interfering with clearance of inhaled bacteria, leading to the chronic lung disease called bronchiectasis.

7. A community health care worker is explaining to a group of factory workers the importance of wearing gloves when working with strong chemicals such as turpentine and paint thinner. Which of the following characteristics of cell membranes underlies the nurse's teaching?
- A) Cell membranes are impermeable to all but lipid-soluble substances.
  - B) Cell membranes have a hydrophilic head and a hydrophobic tail.
  - C) Cell membranes contain receptors for hormones and biologically active substances.
  - D) Transmembrane proteins can pass through the cell membrane into the intracellular environment.

Ans: A

**Feedback:**

Because cell membranes are soluble to some lipid-soluble substances such as organic solvents, such substances should be kept from direct contact with skin cells. The facts that cell membranes have a hydrophilic head and a hydrophobic tail and contain receptors for hormones and biologically active substances do not have a bearing on the nurse's teaching. While transmembrane proteins can indeed pass into the intracellular environment, the nurse is not referring to proteins in the teaching.

8. The nurse is explaining the workings of selective serotonin reuptake inhibitors to a client with a diagnosis of depression. Within the teaching, the nurse mentions that in the nervous system, the transmission of information by neurotransmitters is
- A) synaptic signaling.
  - B) endocrine signaling.
  - C) autocrine signaling.
  - D) paracrine signaling.

Ans: A

**Feedback:**

Synaptic signaling occurs in the nervous system, where neurotransmitters act only on adjacent nerve cells through special contact areas called synapses. Endocrine signaling relies on hormones carried in the bloodstream to cells throughout the body. Autocrine signaling occurs when a cell releases a chemical into the extracellular fluid that affects its own activity. With paracrine signaling, enzymes rapidly metabolize the chemical mediators and therefore act mainly on nearby cells.

9. The nurse is teaching a group of colleagues about the cell division cycle as background to oncology nursing. Which of the following statements is true of the cell cycle?
- A) Some cells lack a  $G_0$  phase.
  - B) Mitosis is a process that occurs in steps over 1 to 2 days.
  - C) The two broad phases of the cell cycle are mitosis and synthesis.
  - D) Nondividing cells such as nerve cells are said to be in the  $S_0$  phase.

Ans: C

**Feedback:**

While consisting of several stages, cell division can be broadly divided into the two phases of mitosis and synthesis. Some cells lack a  $G_1$  stage, not a  $G_0$  phase, and mitosis is a fluid and continuous process over 1 to 1½ hours. Nondividing cells are said to be in the  $G_0$  phase.

10. A 62-year-old male collapsed while unloading a truck of heavy sacks of feed for his cattle. When he arrived in the emergency department, blood gases reveal a slightly acidic blood sample. The nurse caring for this patient is not surprised with this result based on which of the following pathophysiological rationales?
- A) The skeletal muscles are producing large amounts of lactic acid and release it into the bloodstream during heavy work/exercise.
  - B) During exercise, catabolism will break down stored nutrients and body tissues to produce energy.
  - C) Large amounts of free energy are released when ATP is hydrolyzed and then converted into adenosine diphosphate.
  - D) Within the mitochondria, energy from reduction of oxygen is used for phosphorylation of ADP to ATP.

Ans: A

**Feedback:**

Heart muscle is efficient in converting lactic acid to pyruvic acid and then using the pyruvic acid for fuel. Pyruvic acid is an important source of fuel for the heart during heavy exercise when the skeletal muscles are producing large amounts of lactic acid and releasing it into the bloodstream. Therefore, the blood sample would be acidic by nature. Catabolism will break down stored nutrients and body tissues to produce energy. ATP conversion into ADP and phosphorylation of ADP to ATP are both aerobic metabolism processes.



11. The health caregiver is explaining the rationale for administering a hypotonic intravenous solution (lower concentration of solutes in its surroundings) to a client. Which of the following mechanisms of membrane transport most likely underlies this action?

A) Facilitated diffusion  
B) Active transport  
C) Diffusion  
D) Osmosis

Ans: D

**Feedback:**

The fact that body cells are permeable to water but not all solute particles, and the amount of solute relative to water content, underlies the choice of intravenous fluid, in health care. Water moves through water channels in a semipermeable membrane along a concentration gradient, moving from an area of higher to an area of lower concentration. This is the essence of osmosis, and the other mechanisms of membrane transport do not have as significant a bearing on the nurse's action.

12. A nurse is teaching a client with a recent diagnosis of diabetes about the roles that glucose and insulin play in the disease pathology and the fact that glucose must enter the body cell in order to provide energy for the client. The nurse knows that which of the following processes allows glucose to enter body cells?

A) Osmosis  
B) Facilitated diffusion  
C) Active transport  
D) Diffusion

Ans: B

**Feedback:**

Facilitated diffusion involves the movement of a substance like glucose from an area of high concentration, such as the bloodstream, to an area of low concentration, such as the intracellular space, through the use of a transport protein. Osmosis, active transport, and diffusion do not bring about the movement of glucose into body cells.

13. An end-stage renal disease patient has been on peritoneal dialysis at home. Based on his lab work, he regulates the type of solution to infuse into his abdomen. When there is a high concentration of potassium inside the cell (hyperkalemia), the solution infused has a lower concentration so that the potassium ions will diffuse outward. At this point, the cellular membrane is said to be
- A) at equilibrium potential in which no net movement of ions occurs.
  - B) charged with high voltage.
  - C) filled with positive current.
  - D) polarized because of the presence of a negative membrane potential.

Ans: D

**Feedback:**

Because of the large concentration gradient existing across the cell membrane, potassium ions tend to diffuse outward. As they do so, they carry their positive charges with them, causing the inside to become negative in relation to the outside. This new potential difference repels further outward movement of the positively charged potassium ion. The membrane is said to be polarized.

14. A student asks the instructor about the origins of different tissues and their cellular origins during the process of development. Which of the instructor's following statements best describes the process of cell differentiation?
- A) "Cells of the hematopoietic system produce the appropriate body cells that are required at each stage of development."
  - B) "A single stem cell differentiates into approximately 200 different types of cells."
  - C) "A fertilized ovum undergoes a series of divisions, yielding many different cell types."
  - D) "Cells differentiate into necessary body cells peaking after conception and ceasing near the time of birth."

Ans: C

**Feedback:**

Cell differentiation and consequent tissue types are the outcome of the series of cell divisions that occur in the fertilized ovum. It originates neither with a single stem cell nor in the hematopoietic system. Stem cells allow for limited differentiation throughout the life span, not only antepartum.

15. A nurse is providing care for a client with a diagnosis of Crohn disease. The nurse recognizes the fact that the disease involves the inflammation and irritation of the intestinal lining. Which of the following types of tissue is most likely involved in the client's pathology?

A) Simple columnar epithelium  
B) Glandular epithelium  
C) Simple cuboidal epithelium  
D) Stratified epithelium

Ans: A

**Feedback:**

Simple columnar epithelium lines the intestine and has cilia and mucus-secreting goblet cells. The intestinal tract does not consist of glandular epithelium, simple cuboidal epithelium, or stratified epithelium.

16. During a crime scene investigation, the coroner confirms that rigor mortis has set in. This helps to confirm an approximate time of death. The forensic nurse can explain this process (rigor mortis) to a group of students based on the fact that

A) troponin is being prevented from forming a cross-bridge between the actin and myosin.  
B) activated by ATP, cross-bridges become attached to the actin filament.  
C) the myosin head catalyzes the breakdown of ATP to provide the energy need so that a cross-bridge can be formed.  
D) at death, the body is unable to complete the actin/myosin cycle and release the coupling between the myosin and actin, creating a state of muscular contraction.

Ans: D

**Feedback:**

As the muscle begins to degenerate after death, the sarcoplasmic cisternae release their calcium ions, which enable the myosin heads to combine with their sites on the actin molecule. As ATP supplies diminish, no energy source is available to start the normal interaction between the actin and myosin, and the muscle is in a state of rigor until further degeneration destroys the cross-bridges between the actin and myosin.

17. The homecare nurse is making a home visit to a 51-year-old female client with a long-standing diagnosis of multiple sclerosis. The nurse knows that the muscle wasting and weakness associated with the disease process are ultimately manifested as a failure of what normal process in muscle tissue?
- A) The contraction of the epimysium
  - B) The surrounding of fascicles by perimysium
  - C) Thick myosin and thin actin filaments sliding over each other
  - D) The contraction of fascicles within myofibrils

Ans: C

**Feedback:**

The contraction of skeletal muscle tissue can be characterized as the sliding action of myosin and actin. Epimysium surrounds and plays a supportive role in the skeletal muscle, and perimysium similarly provides support but does not actively produce locomotion. Myofibrils are found within fascicles, not the opposite.

18. An instructor is explaining to a group of students the way in which muscles and their associated tendons can be so strongly attached. The instructor makes references to the role of the basal lamina. Which of the following statements most accurately captures an aspect of the basal lamina?
- A) It is produced by the connective tissue adjacent to it.
  - B) It is present where connective tissue contacts the tissue it supports.
  - C) It is found solely between connective tissue and muscle fibers.
  - D) It is also known as the basement membrane.

Ans: B

**Feedback:**

The basal lamina is found where connective tissue is in contact with the tissue that it provides support for. It is produced by epithelial cells and is found on Schwann cells, adipose tissue, and other sites apart from muscle fibers. It is not synonymous with the basement membrane, which consists of the combination of basal lamina and the reticular layer.

19. A caregiver is working with a client who is having poorly controlled pain due to shingles. The associate pain travels to the client's nervous system via
- A) synapses.
  - B) axons.
  - C) afferent neurons.
  - D) efferent neurons.

Ans: C

**Feedback:**

Afferent or sensory neurons carry information toward the CNS; they are involved in the reception of sensory information from the external environment and from within the body. Efferent or motor neurons carry information away from the CNS; they are needed for control of muscle fibers and endocrine and exocrine glands.

20. A 6-year-old child cuts his leg while playing outside. An inflammatory process begins the healing process by moving leukocytes and platelets through the endothelial lining of blood vessels. This process occurs because of which extracellular tissue component?

- A) Extracellular matrix
- B) Glycosaminoglycans
- C) Selectins
- D) Cadherins

Ans: C

**Feedback:**

Selectins are found on activated endothelial cells of blood vessels, on leukocytes, and on platelets. They, together with integrins and immunoglobulins, participate in leukocyte movement through the endothelial lining of blood vessels during inflammation.

Cadherins link parts of the internal cytoskeleton (actin and catenins) with extracellular cadherins of an adjacent cell. Glycosaminoglycans are one of the components of the extracellular matrix.

### Chapter 3- Cellular Adaptation, Injury, and Death

1. Of the following situations, which one would be an example of a maladaptive cellular change?
- A) An 18-year-old body builder who has developed extremely large pectoral muscles following years of weight lifting
  - B) A 31-year-old marathon runner who has developed hypertrophied myocardial cells
  - C) A 54-year-old female who has developed ovarian atrophy following loss of estrogen stimulation during menopause
  - D) A 44-year-old male with a 60-pack-per year smoking history who was diagnosed with a histological grade 3 lung cancer

Ans: D

**Feedback:**

In many adaptive cellular responses, the expression of the differentiation genes is altered. When working with cancer patients, histological grade or differentiation refers to how much the tumor cells resemble normal cells of the same tissue type. In body builders and athletes, cells' hypertrophy is based on the increase in workload placed on the muscle. Reproductive atrophy is expected due to the loss of estrogen stimulation during menopause.

2. A client is experiencing muscle atrophy following 2 weeks in traction after a motor vehicle accident. Which of the following factors has most likely contributed to the atrophy of the client's muscle cells?
- A) High levels of insulin and IGF-1 in the client's blood during immobilization
  - B) Denervation of the affected muscles during the time of traction
  - C) A reduction of skeletal muscle use secondary to the traction treatment
  - D) Reduced oxygen consumption and cellular function that ensures muscle cell survival

Ans: C

**Feedback:**

Disuse atrophy results from the reduction in skeletal muscle use such as that following encasement in plaster casts or traction. Low levels of insulin and IGF-1 contribute to atrophy, and denervation only occurs in paralyzed limbs. Reduced oxygen consumption and cellular function are the mechanisms of cell atrophy but not the causes of the process.

3. The nurse is teaching new nursing assistants on the unit about the phenomenon of muscle hypertrophy. Which of the following clients on the unit is most likely to experience muscle hypertrophy? A client with
- A) urinary incontinence following a cerebral vascular accident (CVA).
  - B) hypertension, obesity, and decreased activity tolerance.
  - C) peripheral edema secondary to heart failure (HF).
  - D) possible rejection symptoms following a liver transplant.

Ans: B

**Feedback:**

Hypertension is a common cause of adaptive hypertrophy, in which cardiac muscle cells increase in size in response to the increased work of circulation over time. The other diagnoses are not associated with muscle hypertrophy.

4. Which of the following clients is at a high risk for developing dilated cardiomyopathy?
- A) A 17-year-old with a diving injury resulting in paraplegia
  - B) A 4-year-old child born with cerebral palsy and confined to a wheelchair
  - C) A 44-year-old noncompliant female who forgets to take her hypertensive medications
  - D) A 78-year-old patient with Alzheimer disease who received a third-degree burn following an oven fire

Ans: C

**Feedback:**

In hypertension, the increased workload required to pump blood against an elevated arterial pressure in the aorta results in a progressive increase in LV muscle mass and need for coronary blood flow. The pressure overload causes hypertrophied cells to have greater width and length. Paraplegia, cerebral palsy, and Alzheimer disease do not increase the workload of the cardiac muscle per se.

5. Which of the following statements by a student demonstrates a sound understanding of the cellular processes of hypertrophy and hyperplasia?
- A) "I know that cells like neurons have little capacity for hyperplastic growth."
  - B) "A remaining kidney can sometimes undergo hyperplasia in response to one that has been removed."
  - C) "When male patients experience 'an enlarged prostate,' they are describing a form of hypertrophy."
  - D) "Clients with cardiomyopathy undergo myocardial hypertrophy with proportional increases in cell length and width."

Ans: A

**Feedback:**

Because they do not normally divide, neurons do not undergo hyperplasia. Remaining organs can display hypertrophy, not hyperplasia, and prostate enlargement is a form of hyperplasia. Cardiomyopathic hyperplasia involves greater increases in cell length than width.

6. A community health care nurse is teaching a group of female high school students about the importance of regular Papanicolaou (Pap) smears. The nurse recognizes that what fact underlies the rationale for this teaching?

A) The active substitution of normal cells in the cervix correlates to cancer risk.  
B) Undifferentiated stem cells are an early indicator of cervical cancer.  
C) Cancer of the uterine cervix develops incrementally at a cellular level.  
D) Dysplasia in the connective tissue of the cervix is a strong precursor to cancer.

Ans: C

**Feedback:**

Cervical cancer is indicated by incremental epithelial changes, beginning with dysplasia. Dysplasia does not involve active cellular substitution, as in the case of metaplasia, nor does it include a role for stem cells. Dysplasia does not normally occur in connective tissue, nor is the cervical lining made up of connective tissue.

7. A home health nurse is making a visit to a family with an 8-month-old infant with severe motor deterioration. The physician has diagnosed the infant with Tay-Sachs disease. The parents are asking the nurse why this happened. The nurse will base her answer knowing the root cause of Tay-Sachs is

A) high exposure to lead in the home environment.  
B) an enzyme defect causing abnormal lipid accumulation in the brain.  
C) hypoxia caused by placing the infant on their abdomen during sleep.  
D) an increase in bilirubin retention leading to destruction of RBCs.

Ans: B

**Feedback:**

Tay-Sachs disease is a genetic disorder resulting from an enzyme defect that results in abnormal lipid accumulation in the brain and other tissues. Lead exposure, hypoxia, and bilirubin retention are not associated with Tay-Sachs disease.



8. A 68-year-old male client with aortic stenosis secondary to calcification of the aortic valve is receiving care. Which of the following statements best captures an aspect of this client's condition?
- A) Paget disease, cancer with metastases, or excess vitamin D may have contributed to the problem.
  - B) Increased calcium intake over time may have contributed to the problem.
  - C) The client has possibly undergone damage as a result of calcification following cellular injury.
  - D) The client has possibly exhibited phosphate retention leading to calcium deposits.

Ans: C

**Feedback:**

Dystrophic calcification is a result of deposition of calcium following cellular injury, such as that which commonly occurs in heart valves. Answers A, B, and D all refer to the phenomena associated with metastatic calcification and the associated increases in serum calcium levels.

9. A nurse in the emergency department admits a male client who has experienced severe frostbite to his hands and toes after becoming lost on a ski hill. The nurse recognizes that which of the following phenomena has contributed to his tissue damage?
- A) Decreased blood viscosity has resulted in interstitial bleeding.
  - B) Reactive vasodilation has compromised perfusion.
  - C) Autonomic nervous stimulation has resulted in injury.
  - D) Decreased blood flow has induced hypoxia.

Ans: D

**Feedback:**

Damage from exposure to cold results from hypoxia, ice crystal formation, and vasoconstriction. Blood viscosity increases, not decreases, and vasoconstriction occurs rather than vasodilation.

10. As part of a first aid class, a health care instructor is teaching a group of industrial workers about how electrical injuries can cause cell damage. Which of the statements made by one of the workers indicates that further teaching is necessary?
- A) "The greater the skin resistance, the greater the amount of deep and systemic damage a victim is likely to incur."
  - B) "The particular pathway that a current takes through the body is very significant."
  - C) "Resistance to flow is the phenomenon that transforms electrical energy into heat."
  - D) "The most severe damage is likely to occur where the current enters and leaves the body."

Ans: A

**Feedback:**

High skin resistance is associated with greater local and superficial burns, rather than deep and systemic damage. The pathway is indeed an important factor in the degree of injury, and this is a result of the transformation of current into heat. Damage is most severe at the point of entry and exit.

11. A client who has had a diagnosis of lung cancer is scheduled to begin radiation treatment. The nurse knows that which of the following statements listed below about potential risks of radiation is most accurate?
- A) "Some clients experience longer-term irritation of skin adjacent to the treatment site."
  - B) "Sometimes you might find that your blood takes longer to clot than normal."
  - C) "The changes that you might see are normally irreversible."
  - D) "The unwanted effects will be limited to the exposed portions of your skin."

Ans: A

**Feedback:**

Chronic radiation dermatitis is a consequence of cancer treatment with ionizing radiation. Hypocoagulation is not an identified consequence of radiation exposure, and changes can be both reversible and deeper than the surface of the skin.

12. A young patient has just been diagnosed with xeroderma pigmentosum. When teaching the family about this disease, the nurse should emphasize which of the following points? Select all that apply.

- A) "Wash hands thoroughly when working in the garden to prevent infection."
- B) "Wear long sleeves, long pants, gloves, a hat, sunglasses with side shields, and sunscreen while outdoors."
- C) "Apply antibacterial ointment to any break in the skin, and cover wounds with bandages."
- D) "The best time to allow the child to play outside is in the evening hours after the sun goes down."
- E) "The best time for the family to go to the beach is in the fall/winter months."

Ans: B, D

**Feedback:**

Xeroderma pigmentosum is a genetic disorder where the enzyme needed to repair sunlight-induced DNA damage is lacking. While washing hands and applying antibacterial products to open wounds are important teaching for parents with children, they are not specific for this disease diagnosis.

13. A 7-year-old boy is admitted to the hospital with a suspected diagnosis of lead toxicity. Which of the following assessment findings is most congruent with the client's diagnosis?

- A) Decreased deep tendon reflexes
- B) Hemoglobin 9.9 g/dL
- C) Diffuse muscle pain
- D) White blood cells (WBC) 11,000/mm<sup>3</sup>

Ans: B

**Feedback:**

Anemia is the cardinal sign of lead toxicity. Muscle pain, decreased deep tendon reflexes, nor changes in WBC levels are associated with lead toxicity.

14. The nurse is teaching a group of new mothers about postpartum nutrition, when one of the clients states that she was told to avoid eating fish too often due to the risk of mercury poisoning. Which of the nurse's following responses most accurately addresses the clients concerns?

A) "You're right. It's best to avoid eating fish, especially while you are breast-feeding."  
B) "There are some modest risks, but they are only associated with some long-living fish."  
C) "Provided you avoid salmon, you likely won't be putting yourself or your child at risk."  
D) "The risk of mercury toxicity from eating fish has been shown to be insignificant."

Ans: B

**Feedback:**

Only long-living fish such as tuna and swordfish concentrate the mercury from sediment in quantities sufficient to pose a risk. It is not necessary to categorically avoid fish, and salmon poses a low risk. Risks are not insignificant, though they are not particularly high.

15. A nurse is teaching a group of older adults about the value of including foods containing antioxidants in their diet. Which of the following statements best captures the rationale underlying the nurse's advice?

A) Antioxidants inhibit the actions of reactive oxygen species.  
B) Antioxidants prevent the formation of superoxide dismutase.  
C) Antioxidants react nonspecifically with molecules.  
D) Antioxidants prevent the occurrence of cell dysplasia.

Ans: A

**Feedback:**

Antioxidants inhibit the reactions of reactive oxygen species (ROS) with biological structures. Superoxide dismutase is an antioxidant itself, and ROS, not antioxidants, react nonspecifically with molecules. Antioxidants do not prevent the occurrence of cell dysplasia.

16. During a myocardial infarction (MI), a patient with a 97% occlusion of his left descending artery develops ventricular arrhythmias due to the amount of ischemia occurring in the myocardium. While educating the patient about MIs, the nurse will base her teaching on the fact that
- A) permanent damage will occur in the myocardium if the vessel is not opened within a 1- to 2-minute window following the occlusion.
  - B) treatment needs to be sought immediately so that the buildup of lactic acid is limited and cellular changes can be reversed.
  - C) once the oxygen supply has been occluded, cellular changes are irreversible even if oxygenation is restored.
  - D) the body will grow new genes through the process of angiogenesis, thereby avoiding any permanent damage to the myocardium.

Ans: B

**Feedback:**

Ischemia is characterized by impaired oxygen delivery and impaired removal of metabolic end products such as lactic acid. Ischemia commonly affects blood flow through limited numbers of vessels and produces local tissue injury. In some instances, the cellular changes due to ischemia are reversible if oxygenation is restored. If not restored, permanent damage can occur.

17. Which of the following statements most accurately conveys an aspect of cell injury due to impaired calcium homeostasis?
- A) Normal intracellular calcium ion levels are higher than extracellular levels.
  - B) Ischemia and certain toxins cause a decrease in cytosolic calcium.
  - C) Injured cells tend to accumulate calcium.
  - D) Low calcium levels cause an activation of damaging enzymes.

Ans: C

**Feedback:**

Injured cells tend to accumulate calcium, though it is unclear whether this is evidence of causation of cell injury. Intracellular calcium levels are normally lower than extracellular levels, and ischemia and certain toxins cause an increase in cytosolic calcium. High calcium levels may cause an activation of damaging enzymes.

18. The nurse is providing care for a client with a diagnosis of amyotrophic lateral sclerosis (ALS). The nurse recognizes which of the following mechanisms is suspected to play a role in the cellular death associated with ALS?

- A) Apoptosis
- B) Liquefaction necrosis
- C) Hypoxic cell injury
- D) Caseous necrosis

Ans: A

**Feedback:**

Although the exact mechanisms of damage are undetermined, ALS is thought to be caused by apoptosis.

19. The nurse is providing care for a 21-year-old female client with gas gangrene secondary to her compound fracture in her arm. Which of the following assessment findings would the nurse most reasonably expect to find when caring for a client with a diagnosis of gas gangrene?

- A) Inflammation of the affected tissue
- B) A positive culture for *Staphylococcus*
- C) Spreading edema
- D) Impaired alveolar gas exchange

Ans: C

**Feedback:**

Spreading edema is a cardinal sign of gas gangrene. It is often caused by *Clostridium* bacteria, not *Staphylococcus*. Inflammation may exist at the interface between affected and unaffected tissue, but not in the dead, affected tissue. Impaired gas exchange would not be a sign.

20. Which of the following enzymes listed below is responsible for cancer cells' ability to prevent aging of the cells and contributes to cellular immortality that is so characteristic of this disease process?

- A) Oxidoreductase
- B) Telomerase
- C) Hydrolase
- D) Isomerase

Ans: B

**Feedback:**

Some cells have telomerase, an enzyme that “rebuilds” telomeres and lessens or prevents shortening. Cancer cells have high levels of telomerase, which prevents senescence and contributes to the cellular immortality that characterizes cancer.

#### Chapter 4- Genetic Control of Cell Function and Inheritance

1. How could a health care professional most accurately explain an aspect of the underlying structure of DNA to a colleague who is unfamiliar with genetics?
- A) "DNA consists of nucleotides plus one of the four nitrogenous bases."
  - B) "In the base pairs, adenine combines with thymine and guanine with cytosine."
  - C) "Thymine and cytosine are considered the purine bases."
  - D) "The backbone of a DNA molecule consists of either deoxyribose or phosphoric acid."

Ans: B

**Feedback:**

The base pairings of DNA are such that adenine combines with thymine and guanine with cytosine. DNA also includes the sugar deoxyribose, while thymine and cytosine are considered the pyrimidine bases. The backbone of DNA includes both deoxyribose and phosphoric acid.

2. A student is trying to understand the possible reasons that a genetic abnormality might exist in an individual. Which of the following reasons is most plausible?
- A) DNA has combined with several types of protein and a small amount of RNA.
  - B) Histones have exerted control on the folding of DNA strands.
  - C) DNA has blocked genetic transcription by preventing access of nucleotides to the DNA surface.
  - D) Chromatin has maintained its stable structure during the DNA replication process.

Ans: D

**Feedback:**

To facilitate DNA replication and gene expression, chromatin must change its structure through the process of chromatin remodeling. Answers A, B, and C all denote normal genetic processes.

3. A 45-year-old client who experienced exposure to radiation during an industrial accident several years prior is being assessed. Which of the following phenomena may underlie the genetic changes that have been noted in the client?
- A) Base pairs may have been rearranged by the radiation in the accident.
  - B) Endonucleases may have influenced the DNA structure following exposure.
  - C) Two paired bases may have exchanged helical position after the accident.
  - D) The radiation may have produced a redundant or degenerate genetic code.

Ans: A

**Feedback:**

Radiation exposure can cause the rearrangement of base pairs and resultant mutation. Endonucleases facilitate gene repair, and base pairs are not noted to swap positions from their respective sides of the helical strand. Redundant or degenerate genetic code is a normal trait.

4. A researcher is involved in the investigation of an individual's genetic abnormality. Which of the following situations could the researcher most likely rule out as the genetic cause of a mutation?
- A) Loss of a cytosine–guanine base pair
  - B) Formation of an adenine–uracil base pair
  - C) Substitution of an adenine–thymine base pair for a cytosine–guanine base pair
  - D) Insertion of an extra adenine–thymine base pair

Ans: B

**Feedback:**

RNA contains uracil instead of thymine. Formation of an adenine–uracil base pair is a normal event during assembly of messenger RNA.

5. In the context of an explanation of how human growth occurs, a student is explaining to a colleague the necessity and roles of different types of RNA in protein synthesis. Which of the following types of RNA is a result of the process of transcription?
- A) Ribosomal RNA
  - B) Messenger RNA
  - C) Translation RNA
  - D) Transfer RNA

Ans: B

**Feedback:**

Messenger RNA results from the process of breakage and recombination of DNA strands, which is known as transcription. Ribosomal RNA and transfer RNA are not involved in the process of transcription, and translation RNA is not a type of RNA.



6. A 31-year-old male has been newly diagnosed with early-onset Parkinson disease. As the nurse is educating the patient and family, they ask how this happened so early in his life. The nurse will base the response on which of the following statements listed below?
- A) "No one really knows why some patients get this diagnosis in their 30s, while others are in their 50s before they begin to have symptoms."
  - B) "Sometimes exposure to too much ultraviolet radiation causes changes in your gene sequencing and therefore mutations occur."
  - C) "Disruption in some proteins called molecular chaperones causes intracellular molecules to become denatured and insoluble leading to clumping and the development of inclusion bodies."
  - D) "Gene repression is a process by which a regulatory gene acts to reduce or prevent gene expression, thereby confusing the negative feedback mechanisms that could prevent disease formation."

Ans: C

**Feedback:**

An international project was charged with developing genetic and physical maps that allowed the precise location of genes and with exploring technologies that would enable the sequencing of large amounts of DNA with high accuracy and low cost. It is still undergoing experimental testing. The function of a chaperone is to assist a newly synthesized polypeptide chain to attain a functional conformation as a new protein and then assist the protein's arrival at the site in the cell where the protein carries out its function. Disruption of chaperoning mechanisms causes intracellular molecules to become denatured and insoluble. These denatured proteins tend to stick to one another, precipitate, and form inclusion bodies. The development of inclusion bodies is a common pathologic process in Parkinson's. Gene repression is a process by which a regulatory gene acts to reduce or prevent gene expression.

7. While discussing embryogenesis to a group of students moving through the maternity ward, the nurse quizzes them to see if they know what is happening during sonic hedgehog signaling. Which of the following answers would be considered accurate? Select all that apply.

- A) Development of the eyes
- B) Separation of the brain into two cerebral hemispheres
- C) A carrier system for delivering the appropriate amino acids to the ribosomes
- D) Development of the correct number of fingers and toes
- E) Bone formation leading to macrocephaly

Ans: B, D

**Feedback:**

Sonic hedgehog signaling is involved in many key developmental events at multiple times during embryogenesis. It participates in such diverse developmental steps as establishment of the left-to-right axis responsible for the rostral–caudal orientation of the nervous system, the separation of the brain into two cerebral hemispheres, right and left eye orientation, and the separation and development of the correct number of fingers and toes. The PAX family of transcription factors is responsible for the development of the eye. Transfer RNA acts as a carrier system for delivering the appropriate amino acids to the ribosomes. Bone formation leading to macrocephaly is caused by fibroblast growth factors.

8. A physician is working with a family whose daughter has been recently diagnosed with the chromosomal disorder Turner syndrome. The physician would recognize that which of the following statements about the characteristics of human chromosomes is accurate?

- A) Individual variations are attributable to differences in appearance in autosomes.
- B) Chromosomes undergo variations during each episode of cell division.
- C) Autosomes contain the determination of an individual's sex.
- D) Each of the 22 pairs of autosomes has a homolog.

Ans: D

**Feedback:**

Each of the 22 autosomes contains a homolog in the diploid cell. Autosomes are consistent from individual to individual with regard to appearance. Chromosomes retain their integrity in cell divisions, and sex determination is found in the 23rd chromosome.

9. A man and woman are eager to determine the sex of their unborn child and have asked the nurse at the fertility clinic how this is possible at an early stage of in vitro development. Which of the nurse's responses best captures the genetic rationale for early sex identification through tissue samples?

A) "The inactive X chromosome can be visible in a female."  
B) "The cells of a male contain a Barr body that can be visualized."  
C) "A normal female lacks Barr bodies."  
D) "The number of visible Y chromosomes indicates the sex."

Ans: A

**Feedback:**

The fact that the inactive X chromosome can be visible as a Barr body in a female allows for the extrapolation of the number of X chromosomes and thus the sex associated with the cells. Normal male cells lack Barr bodies, but they are present in females. The number of X chromosomes ultimately determines the sex of an individual.

10. A health care researcher has identified the gene of interest in a particular genetic disorder as well as the gene's location Xq97. Where would one find a gene named Xq97?

A) Band q, region 97 of the Y chromosome  
B) Band 7, region 9 of the short arm of the X chromosome  
C) Band 9, region 7 of the long arm of the X chromosome  
D) Band 9, region 7 of the short arm of the Y chromosome

Ans: C

**Feedback:**

In gene names, the first letter stands for the chromosome. The second indicates the arm of the chromosome, p (short) or q (long). The first numeral indicates the band, and the second one indicates the region within that band.

11. A child possesses a trait that is the result of the interaction of two different genes, neither of which could have produced the trait independently. Which of the following explanations best captures the genetic explanation for this?

A) The trait is an expression of multiple alleles.  
B) Epistasis has dictated the phenotypic outcome.  
C) The phenomenon is an example of polygenic inheritance.  
D) The outcome is the result of the interaction between collaborative genes.

Ans: D

**Feedback:**

The expression of two genes influencing the same phenotype, neither of which could have produced it alone, is an example of collaborative genes. Multiple *alleles* involve more than one gene at a particular locus affecting the same trait, and in epistasis, a gene masks the phenotypic effects of another nonallelic gene. Polygenic inheritance involves multiple genes each affecting a small influence on a genetic outcome.

12. A health care professional works in a context where there are a large number of clients who live with genetic disorders. Which of the following circumstances would most likely involve an individual who has a genetic disorder?
- A) The primordial germ cells of both of the individual's parents have undergone meiosis.
  - B) Two chromosomes of the same number have been inherited from one parent.
  - C) The individual possesses 22 pairs of autosomes.
  - D) The individual's karyotype indicates separate X and Y chromosomes at chromosome 23.

Ans: B

**Feedback:**

When two chromosomes of the same number are inherited from one parent, the result can be the disorder of uniparental disomy. Answers A, C, and D all relate normal genetic processes.

13. Mary is heterozygous for blue eyes, a recessive trait. John is homozygous for brown eyes, a dominant trait. What color eyes will their four children have?
- A) Brown
  - B) Blue
  - C) Some will have blue, and some will have brown
  - D) Impossible to tell

Ans: A

**Feedback:**

A heterozygote with a dominant and a recessive allele will have the dominant phenotype. In Mary's case, this will manifest itself in her brown eyes. A homozygote with two dominant alleles will have the dominant phenotype, so John also has brown eyes. To have blue eyes, the children would have to inherit two alleles for blue eyes. Because they will inherit, at most, one recessive allele for blue eyes, the children's eyes will be brown.

14. Knowing that persons with blonde hair exhibit the phenotype of a recessive gene, which of the following genetic scenarios would most likely underlie such a trait?
- A) aa
  - B) A heterozygous pairing
  - C) Either AA or Aa
  - D) Different alleles at a gene locus

Ans: A

**Feedback:**

A recessive trait is expressed solely in a homozygous pairing, such as aa. A heterozygous pairing, in which there are two different alleles at a gene locus, will not express a recessive trait. Aa is an example of a heterozygous pairing.

15. A group of researchers have identified that the prevalence of two particular genetic disorders shares a statistical correlation. Which of the following statements best conveys the genetic rationale for this situation?
- A) There is likely a cause-and-effect relationship between the two genes responsible.
  - B) The chromosomes containing each gene are likely closely situated.
  - C) The genes causing each disorder are likely in the same section of the same chromosome.
  - D) The disorders likely share the same locus.

Ans: C

**Feedback:**

The genes causing these problems are likely proximate in the same chromosome. They would not likely be correlated if they were in different chromosomes, and the situation is not indicative of a cause-and-effect relationship. The genes are likely closely situated, but they could not share the same locus.

16. When educating the parents of an infant diagnosed with hemochromatosis, the nurse should consider which of the following topics a priority for the parents to know?
- A) Provide a restricted iron diet to prevent organ damage
  - B) How to check their infants' stools for blood
  - C) Where to look for lesion development on the skin
  - D) How to assess an infant for blood loss and anemia

Ans: A

**Feedback:**

Postnatal linkage studies have been used in the diagnosis of hemochromatosis, which is closely linked to another HLA type. People with this disorder are unable to metabolize iron, and it accumulates in the liver and other organs. It cannot be diagnosed by conventional means until irreversible damage has been done. Dietary restriction of iron intake may be used to prevent organ damage.

17. A student is explaining to her colleague the different methods that are available for genetic mapping. Which one of the colleague's following statements indicates a need for further teaching?
- A) "I know that linkage studies are rooted in the exchange of genes that occurs during meiosis."
  - B) "Gene dosage studies involve the measurement of enzyme activity as a reflection of genetic activity."
  - C) "If hybrid cells were stable, somatic cell hybridization would not be viable."
  - D) "In situ hybridization focuses on genes that can express themselves in cell culture."

Ans: D

**Feedback:**

In situ hybridization examines genes that do not express themselves in cell culture. The rationale for linkage studies exists in the genetic exchange of genes that occurs during meiosis, and gene dosage is a reflection of gene activity. Somatic cell hybridization necessitates the fact that hybrid cells degrade during division.

18. A researcher is involved in the production of insulin through recombinant DNA technology. Which of the following statements could the researcher best provide as a rationale for her work?
- A) The gene fragment responsible for insulin production can be isolated and reproduced.
  - B) Particular bacteria are capable of insulin production.
  - C) It is possible to reproduce the chromosome responsible for insulin production.
  - D) Recombination of DNA base pairs can result in a gene that will produce insulin.

Ans: A

**Feedback:**

The gene fragment that initiates and controls the production of several human proteins, including insulin, can be identified, separated, and reproduced by recombinant technology. Bacteria are used as a medium of reproduction, but they are not inherently capable of insulin production. Recombinant technology does not take place at the macrochromosomal level or at the micro- base pair level.

19. Which of the following patients are receiving treatment that has been developed utilizing recombinant DNA techniques? Select all that apply.
- A) Patient undergoing detection of gene location by chemically tagging DNA or RNA sequences
  - B) Mother undergoing amniocentesis to diagnose a congenital adrenal hyperplasia
  - C) End-stage renal disease patient receiving erythropoietin to stimulate RBC production
  - D) Stroke victim receiving tissue plasminogen activator (tPA) to dissolve the thrombi
  - E) Couple going to an infertility clinic for diagnostic testing

Ans: C, D

**Feedback:**

Recombinant DNA technology has made it possible to produce proteins that have therapeutic properties. These include erythropoietin, which is used to stimulate RBC production, and tissue plasminogen activator (tPA), which is frequently administered to dissolve thrombi. *In situ hybridization* involves the use of specific sequences of DNA/RNA to locate genes. Prenatally, the autosomal recessive disorder congenital adrenal hyperplasia is diagnosed through amniocentesis.

20. While the nurse is educating a fellow nurse about some new research being developed to treat hepatitis C, specifically to identify disease-related drug targets on the cells, the nurse will be basing these data on which new technology finding?
- A) Recombinant DNA technology
  - B) Haplotype mapping
  - C) The human genome project
  - D) Interference RNA (RNAi)

Ans: D

**Feedback:**

Pharmaceutical companies are using RNAi to identify disease-related drug targets. There is considerable interest in harnessing RNAi for therapeutic purposes, linking the treatment of HIV infection and hepatitis C.

## Chapter 5- Genetic and Congenital Disorders

1. An infant who is 4 days postpartum has been diagnosed with a single-gene disorder. The parents of the child have a number of questions about the etiology of the health problem, which the physician is attempting to address in detail. Which of the following teaching points most accurately captures an aspect of single-gene congenital disorders?
  - A) Affected genes are present on autosomal chromosomes rather than sex chromosomes.
  - B) The majority of single-gene disorders manifest near the time of puberty.
  - C) A particular defect can be caused by mutations at several different loci.
  - D) Single-gene disorders are associated with existing rather than new mutations.

Ans: C

**Feedback:**

A particular defect is not limited to any one specific locus. Single-gene disorders can be present on either autosomal or sex chromosomes, and they are primarily pediatric disorders. They can result from either existing or new mutations.

2. A male client of a nurse practitioner has an autosomal dominant disorder. The client and his partner are considering starting a family. Which of the following statements indicates the client has an adequate understanding of the genetic basis of this health problem?
  - A) "I know there's no way of accurately determining the chance that my child will inherit the disease."
  - B) "My children who don't have the disease still run the risk of passing it on to their children."
  - C) "I know that new genetic mutations won't occur between generations."
  - D) "I know that a single mutant allele is to blame for the health problem."

Ans: D

**Feedback:**

Autosomal dominant disorders are the result of a single mutant allele from an affected parent. There is a 50% risk of transmission, and unaffected people do not pass on the disorder. New genetic mutations may occur between generations.

3. A 6-year-old girl with a diagnosis of Marfan syndrome is being assessed at a community health clinic. Which of the following assessments would be the health care professional's lowest priority?
  - A) A test of the child's visual acuity
  - B) A musculoskeletal assessment
  - C) Tests of kidney function
  - D) Cardiovascular assessment

Ans: C

**Feedback:**

The autosomal dominant disorder of Marfan syndrome is primarily manifested in the ocular, cardiovascular, and skeletal systems. These assessments would take priority over renal assessment.



4. A clinician who works on a cardiac care unit of a hospital is providing care for a number of clients. Which client most likely has a genetic disorder arising from inheritance of a single gene?

A) A short, thin, 56-year-old woman with hypertension  
B) A tall, thin, myopic, 28-year-old woman with mitral valve prolapse  
C) An overweight, middle-aged male smoker with coronary artery disease  
D) A thin, middle-aged nonsmoking man with a repaired atrial septal defect

Ans: B

**Feedback:**

This patient exhibits several classic signs of Marfan syndrome, an autosomal dominant genetic disorder of the connective tissue. The other patients show signs of heart disease most likely caused by multiple factors.

5. The nurse working in a pediatric office is scheduled to assess a female adolescent diagnosed with neurofibromatosis (NF) type 1. During this assessment, the nurse should be assessing the teenager for which of the following clinical manifestations of NF-1? Select all that apply.

A) Irregular menstrual periods  
B) Severe scoliosis  
C) Hearing loss  
D) Complaints of having a hard time concentrating in school  
E) Speech impediments

Ans: B, D, E

**Feedback:**

NF-1 children have many problems, often not apparent until puberty. They tend to have large tumors that cause facial disfigurement, skeletal deformities such as scoliosis, and neurologic complications like learning disabilities, attention deficit disorders, and speech abnormalities.

6. A new older female client at a long-term care facility has a diagnosis of type 1 neurofibromatosis. As part of the intake assessment protocol for the facility, the clinical educator is teaching the care staff about the diagnosis. Which of the following statements most accurately conveys an aspect of neurofibromatosis?

A) "The neurofibroma lesions are unsightly for the client, but they are not painful."  
B) "Her diagnosis puts her at higher risk of developing a malignant neoplasm."  
C) "She is living with an example of an autosomal recessive disorder."  
D) "The client is likely to be photosensitive as a result of the disease."

Ans: B

**Feedback:**

NF-1 is associated with increased risk of malignant neoplasm. The lesions may be painful to the client, and the disease is an autosomal dominant disorder. Photosensitivity is not noted as a complication of type 1 neurofibromatosis.

7. As part of an orientation to a genetic counseling practice, a group of medical students are differentiating between autosomal recessive disorders and autosomal dominant disorders. Which of the following statements is true of autosomal recessive disorders?
- A) They can manifest when present in one or both gene pairs.
  - B) There is a one in two chance of an affected child in each pregnancy with an affected mother.
  - C) They tend to have a more uniform symptomatology than autosomal dominant disorders.
  - D) The associated disorders are usually attributable to abnormalities in structural proteins.

Ans: C

**Feedback:**

Autosomal recessive disorders tend to have a more uniform symptomatology than autosomal dominant disorders. Their incidence is dependent on both members of the gene pair being affected, and there is a one in four risk of an affected child with each pregnancy. The associated disorders are usually attributable to enzyme deficiencies.

8. A 6-year-old boy who has mental retardation secondary to fragile X syndrome has been admitted to hospital with a mitral valve prolapse. A health care worker who is providing care for the family should have which of the following statements as part of her knowledge base around the disease?
- A) The common pattern of inheritance is an affected mother who carries one normal and one mutant allele.
  - B) The boy's mother had a 100% chance of transmitting the defective gene to her son.
  - C) Genes of the boy's Y chromosome can be affected in addition to the X chromosome.
  - D) The boy will pass the gene to all his future daughters who will become carriers.

Ans: D

**Feedback:**

When the affected son procreates, he transmits the defective gene to all of his daughters, who become carriers of the mutant gene. The most common pattern of inheritance for fragile X syndrome is an unaffected mother carrying one normal and one mutant allele. The Y chromosome is not affected.

9. Two health care workers are comparing the etiology and incidence of multifactorial inheritance disorders and single-gene disorders. Which of the following statements best captures the relationship between the two types of genetic disorders?
- A) "Multifactorial disorders and single-gene disorders can both be predicted quite accurately."
  - B) "Multifactorial disorders are more likely to involve multiple organs."
  - C) "Multifactorial disorders manifest themselves at birth."
  - D) "A couple with a child with a multifactorial disorder has a higher risk of having another with the same disorder."

Ans: D

**Feedback:**

Parents of a child with a multifactorial disorder have a higher chance of having the disorder recur with another child. Multifactorial disorders are less predictable than single-gene disorders and usually involve single organs. They can manifest themselves at any point in the life span.

10. While taking their daily walk, the nurse is asked by a neighbor what *centric fusion (robertsonian) translocation* means. She tells you that a family member has been diagnosed with this and is now afraid to have children. Given this diagnosis, what may be potential risks for her offspring?
- A) If chromosome 21 is involved, there is a high risk for producing a child with Down syndrome.
  - B) Since the extremely short fragment only contains a small amount of genetic material, there should be no additional risk than the normal population.
  - C) This translocation of genetic material places the child at high risk for having multiple limb abnormalities.
  - D) Cleft lip with cleft palate is frequently associated with this translocation of genetic material.

Ans: A

**Feedback:**

In *centric fusion or robertsonian translocation*, the break occurs near the centromere affecting the short arm in one chromosome (13 and 14 or 14 and 21 most commonly). The short fragment is usually lost during subsequent divisions. In this case, the person has only 45 chromosomes, but the amount of genetic material lost is small. Difficulty arises during meiosis. The chief clinical significance arises when the translocation carriers involve chromosome 21, which may produce a child with Down syndrome.

11. A physician is working with a 30-year-old male client with Down syndrome who has been admitted to hospital with a diagnosis of acute leukemia. Which of the following physical assessment findings would the physician be more likely to find in an examination of this client than in other clients without Down syndrome?

- A) Hepatomegaly
- B) Decreased visual acuity
- C) Congenital heart defects
- D) Diabetes mellitus

Ans: C

**Feedback:**

Congenital heart defects are associated with Down syndrome. Hepatomegaly, visual disturbances, and diabetes are not associated with Down syndrome.

12. An 11-year-old girl is suspected of having Turner syndrome. Which of the following diagnostic tests would be the most useful component of screening to confirm or rule out the diagnosis?

- A) Computed tomography of the head
- B) Echocardiogram
- C) Bone scan
- D) Liver biopsy

Ans: B

**Feedback:**

Because of the association between congenital heart defects and Turner syndrome, an echocardiogram would most likely yield useful results. Turner syndrome is not associated with brain, skeletal, or liver involvement, and these tests would be less likely to provide useful insight.

13. If a male child was born with Klinefelter syndrome, as the child matures and becomes an adolescent, the nurse will assess the child for which of the following clinical manifestations listed below? Select all that apply.

- A) Enlarged breast tissue
- B) Sparse facial and pubic hair
- C) Tall stature out of proportion
- D) Severe mental retardation
- E) Higher than average linguistic skills

Ans: A, B, C

**Feedback:**

Klinefelter syndrome is characterized by breast enlargement, sparse facial and body hair, small testes, and inability to produce sperm. At puberty, testes do not respond to stimulation from gonadotropins and undergo degeneration. This leads to a tall stature with abnormal body proportions. Although the intellect usually is normal, most 47, XXY males have some language impairment.

14. As part of her prenatal care, a pregnant woman and her partner are being taught by a community health nurse. Which of the following points about the teratogenic effects of different substances should the nurse include in his teaching?
- A) "Your developing baby is most vulnerable during the first 2 months of your pregnancy."
  - B) "You need to be very careful with vitamin D and its derivatives."
  - C) "Keep in mind that a high percentage of genetic abnormalities are attributable to drug origins."
  - D) "Your best option is to avoid using any drugs during your pregnancy."

Ans: A

**Feedback:**

The period between days 15 and 60 is the most susceptible time during development. Vitamin A, not D, poses a particular risk, and only 2% to 3% of anomalies are attributable to drug and environmental factors. It is not necessary to categorically avoid medication but rather to use caution and heed FDA guidelines.

15. While taking a prenatal history, the nurse would be most concerned about severe teratogenic effects on the fetus if the mother admits to taking which medications prior to finding out that she was pregnant. Select all that apply.
- A) Warfarin (Coumadin) for chronic atrial fibrillation
  - B) Ethyl alcohol ingestion regularly every weekend and some nights throughout the week
  - C) Isotretinoin (Accutane) for acne
  - D) Over-the-counter cetirizine (Zyrtec) for seasonal allergies
  - E) Tetracycline for acne

Ans: A, B, C, D

**Feedback:**

Several medications have been considered teratogenic. They include thalidomide, antimetabolites, warfarin, anticonvulsants, ethyl alcohol, cocaine, propylthiouracil, tetracycline, and Accutane.

16. A woman gives birth to a small infant with a malformed skull. The infant grows abnormally slowly and shows signs of substantial cognitive and intellectual deficits. The child also has facial abnormalities that become more striking as it develops. What might you expect to find in the mother's pregnancy history?

A) Folic acid deficiency  
B) Chronic alcohol use  
C) Chronic cocaine use  
D) Active herpes simplex infection

Ans: B

**Feedback:**

The infant's signs and symptoms are characteristic of fetal alcohol syndrome. Folic acid deficiency is associated with neural tube defects, such as anencephaly and spina bifida. Cocaine use is associated with some of the same signs and symptoms as alcohol use but does not produce the characteristic facial abnormalities of fetal alcohol syndrome. Herpes simplex infection, although it is associated with microcephaly, hydrocephalus, defects of the eye, and hearing problems, also does not produce characteristic facial abnormalities.

17. Which of the following pregnant women has most likely encountered the greatest increase in the risk that her child will have a fetal anomaly?

A) A woman with diagnoses of syphilis and cirrhosis of the liver  
B) A woman who has herpes simplex and who has recently recovered from endocarditis  
C) A woman with chronic obstructive pulmonary syndrome and tuberculosis  
D) A woman with diagnoses of insulin-dependent diabetes mellitus and peripheral neuropathy

Ans: B

**Feedback:**

Herpes is among the microorganisms most commonly responsible for fetal anomalies. Syphilis and tuberculosis infections are also implicated but to a lesser degree. The other listed diagnoses are not noted to be associated with fetal anomalies.

18. While traveling throughout Asia, a young couple was exposed to many cultural experiences. One day, they were standing in line, and the person in front of them was clearly displaying signs of illness and had a pink or light red rash on his face with itching. Their guide commented on a recent outbreak of rubella. Upon return to the United States, the couple found out they were pregnant. Upon arrival at the clinic, they are very concerned about their possible exposure to rubella. From this history, the nurse knows that this infant is at high risk for which of the following complications? Select all that apply.

- A) Blindness or cataracts
- B) Deafness
- C) Facial deformities like small palpebral fissures or thin vermilion border
- D) Short, flipper-like appendages
- E) Small outbreak of blisters around its eyes and mouth 2 weeks after delivery

Ans: A, B

**Feedback:**

Rubella remains endemic in many developing countries, however, where it is the major preventable cause of hearing impairment, blindness, and adverse neurodevelopmental outcomes. Facial deformities are common with fetal alcohol exposure. Short, flipper-like appendages are usually a result of thalidomide. Small outbreak of blisters around the infant's eyes and mouth may be related to early development of herpes simplex.

19. A couple who are pregnant with their first child have made an appointment with a clinical geneticist to discuss prenatal screening. The man states that they, "just want to make sure that there is nothing wrong with our baby." How could the clinician best respond to this statement?

- A) "We can't rule out all abnormalities, but a routine fetal tissue biopsy can yield useful information."
- B) "Testing the umbilical blood and performing amniocentesis can give us some information, but not a guarantee."
- C) "Prenatal screening is not usually necessary unless you are among a high-risk group."
- D) "You need to be aware that if abnormalities are detected, termination is normally required."

Ans: B

**Feedback:**

Prenatal screening provides a useful, but incomplete, picture of fetal health; umbilical sampling and amniocentesis are common methods of screening. Fetal tissue biopsy is a rarely used screening method, and a couple need not belong to a high-risk group to benefit from prenatal screening. Abnormalities do not usually necessitate termination.

20. While preparing a patient about to undergo percutaneous umbilical cord blood sampling, which of the following information should the nurse provide as preprocedure teaching? Select all that apply.

- A) Once the procedure is begun, you must lie very still since they will be inserting a needle through the uterine wall.
- B) We will put you into the stirrups and dilate your cervix with a small catheter so that we can obtain a cord sample.
- C) During the procedure, an ultrasound will be utilized to guide the catheter into the correct position.
- D) We will send a sample of amniotic fluid to a regional medical center to have DNA tests performed for any genetic abnormality.

Ans: A, C

**Feedback:**

PUBS is an invasive diagnostic procedure that involves the transcutaneous insertion of a needle through the uterine wall and into the umbilical artery. It is performed under ultrasound guidance and can be done any time after 16 weeks of gestation.

Amniocentesis is the withdrawal of a sample of amniotic fluid for abnormal fetal screening as well as for chromosomal analysis. In chorionic villus sampling, the transcervical approach may be used (answer B).



## Chapter 6- Neoplasia

1. Which of the following characteristics could apply to healthy somatic cells rather than cancerous cells?
  - A) A high rate of mutation exists in the cells.
  - B) The cells have a reduced tendency to cluster together.
  - C) They remain viable and multiply without attachments to other cells and the extracellular matrix.
  - D) The cells are unable to proliferate except by mitotic division.

Ans: D

**Feedback:**

Mitotic division is the normal method of division that exists in the body. High rates of mutation, reduced adhesion, and loss of anchorage dependence are associated with cancer cells.

2. Following a biopsy, a 54-year-old man has been diagnosed as having a benign neoplastic tumor. Which of the following characteristics most likely applies to his tumor?
  - A) The tumor is poorly approximated and has the potential to break loose.
  - B) The tumor may secrete hormones or cytokines.
  - C) The well-differentiated, neoplastic cells are clustered together in a single mass.
  - D) It has a rapid rate of growth and can induce ischemia.

Ans: C

**Feedback:**

Benign tumors are composed of well-differentiated, neoplastic cells that resemble the cells of the tissues of origin and are characterized by a slow, progressive rate of growth that may come to a standstill or regress. They tend to exist in a single mass. Malignant tumors tend to be poorly differentiated, grow rapidly, secrete hormones or cytokines, and have the potential to break loose.

3. A 77-year-old male client with a diagnosis of stomach cancer has been found to have metastases in his liver. The client and his family are surprised at this turn of events, stating that they do not see how he could have developed cancer in his liver. Which of the following facts would underlie the reply that the care team provides?
- A) The parenchymal tissue of the liver is particularly susceptible to secondary malignancies.
  - B) The portal circulatory system brings venous blood from the GI tract into the liver.
  - C) Hepatic stromal tissue shares characteristics with cancerous cells, including lack of anchorage dependence.
  - D) The proximity of the liver to the stomach allows for direct spread of cancerous cells due to a lack of contact inhibition.

Ans: B

**Feedback:**

Portal circulation brings venous blood into the portal vein of the liver, facilitating hematologic spread. The parenchyma of the liver possesses no particular susceptibility to cancer, and hepatic tissue does not share traits of cancerous cells such as low contact inhibition or a lack of anchorage dependence.

4. A 41-year-old female with a family history of breast cancer has had a baseline mammogram. She states that she performs monthly self-breast exams but really has a hard time evaluating her lumps since she has numerous cysts. At her annual mammogram, the technician views a suspicious area and refers her to the radiologist. She asks the nurse in the office, "How can a lump appear so quickly?" The nurse's response is based on which of the following principles?
- A) A tumor is undetectable until it has doubled 30 times and contains at least 1 billion cells.
  - B) Many tumor cells never leave the M-phase of the cell cycle.
  - C) Cancer cells are undifferentiated and come in various shapes and sizes.
  - D) If the breast has a lot of cysts, then the fluid within those sacs makes it difficult to feel the hard lumps of a cancer.

Ans: A

**Feedback:**

The ratio of dividing cells to resting cells in a tissue mass is called the growth fraction. The doubling time is the length of time it takes for the total mass of cells in a tumor to double. Tumors do not stay in the M-phase of the cell cycle. Undifferentiated cancer cells do come in various shapes and sizes, but this has nothing to do with the detection of the tumor by palpation. Breast cysts are fluid-filled sacs but are usually not cancerous.

5. Unbeknownst to her or her care team, a 51-year-old woman's breast cancer has an etiology rooted in the fact that tumor-suppressing genes are present but have been silenced. Consequently, she has not synthesized normal cancer-suppressing proteins, and neoplasia has resulted. What process has accounted for the woman's cancer?
- A) Chromosomal translocation
  - B) The “two-hit” hypothesis of carcinogenesis
  - C) Epigenetic mechanisms
  - D) A DNA repair defect

Ans: C

**Feedback:**

Epigenetic mechanisms may *silence* genes, such as tumor suppressor genes, so that even though the gene is present, it is not expressed and a cancer-suppressing protein is not made. This process does not involve defects in DNA repair or chromosomal translocation, and while it may form a half of the “two-hit” hypothesis, this is not synonymous with epigenetic mechanisms.

6. Which of the following patients of a primary care physician would not require extra screening for cancer?
- A) A 51-year-old woman whose grandmother died of breast cancer
  - B) A 48-year-old man who takes immunosuppressant drugs following a kidney transplant
  - C) A 50-year-old male who is obese and has a low-fiber, high-fat diet
  - D) A 38-year-old female with Down syndrome and congenital scoliosis

Ans: D

**Feedback:**

While a family history of cancer, immunosuppression, and poor diet are all associated with cancer, congenital and chromosomal abnormalities are not noted to represent an increased risk for cancer.

7. Blood-borne cancerous cells have recently spread from a woman's primary tumor in her pancreas to her bones. Which of the following components of the woman's immune system are likely to be directly involved in the attempt to eradicate the potential metastasis? Select all that apply.

A) T lymphocytes  
B) Macrophages  
C) Natural killer (NK) cells  
D) B cells  
E) Mast cells

Ans: A, B, C, D

**Feedback:**

Virtually all of the components of the immune system have the potential for eradicating cancer cells, including T lymphocytes, B lymphocytes, antibodies, macrophages, and natural killer (NK) cells. Although best known for their role in allergy and anaphylaxis, mast cells play an important protective role as well, being intimately involved in wound healing and defense against pathogens.

8. A woman is surprised to read on the Internet that certain infections can cause cancer and has sought clarification from her family physician during an office visit. How can the physician best respond to the woman's query?

A) "Though it's not particularly common, it's true that certain bacteria and viruses can lead to cancer."  
B) "Most cancers that cannot be attributed to family history or lifestyle are in fact associated with viruses."  
C) "There are many viruses, but only a very few of them have been shown to cause cancer in humans."  
D) "This is true; for example, HIV has been shown to cause cancer in some patients."

Ans: C

**Feedback:**

Four DNA viruses have been implicated in human cancers: the human papillomavirus (HPV), Epstein-Barr virus (EBV), hepatitis B virus (HBV), and human herpesvirus-8 (HHV-8). Bacteria have not been linked with cancer, and viruses do not account for a large proportion of cancer cases. HIV is associated with an increased risk of cancer caused by HHV-8, but HIV itself does not cause cancer.

9. The family of a 68-year-old man who is in the end stages of small cell lung cancer are distraught at his visible body wasting that has worsened in recent weeks. Which of the following phenomena best accounts for the client's anorexia and cachexia?
- A) Inadequate cellular metabolism of glucose results from tumor factors.
  - B) High fat losses coupled with preservation of muscle mass exaggerate the appearance of wasting.
  - C) Products of the tumor itself as well as a hypermetabolic state cause cachexia.
  - D) Inadequate food intake due to symptoms and treatment results in loss of both muscle and fat.

Ans: C

**Feedback:**

The mechanisms of anorexia–cachexia in cancer patients are multifactorial, involving factors that include a hypermetabolic state and the production of specific cytokines and catabolic factors by the tumor. Glucose metabolism itself is not noted to be affected by tumors, and muscle mass is lost in large amounts. The phenomenon is not necessarily attributable to the decrease in food intake.

10. The nurse caring for a lung cancer patient with metastasis to the brain suspects the patient has developed a paraneoplastic syndrome known as syndrome of inappropriate antidiuretic hormone (SIADH) secretion. Which laboratory result in this patient who has gained 3 lb in a day would alert the nurse to the possibility of SIADH?
- A) Serum potassium of 5.0 mmol/L
  - B) Serum sodium of 115 mmol/L
  - C) BUN of 8 mg/dL
  - D) Hematocrit of 40%

Ans: B

**Feedback:**

SIADH is the principal cause of hyponatremia in malignant disease. It may be caused by oat cell carcinoma of the lung and certain other malignant tumors or be due to the tumor producing vasopressin. The other lab values, K<sup>+</sup>, BUN, and hematocrit are all within normal adult ranges.

11. A 60-year-old man has presented to a clinic and is requesting screening for tumor markers after reading about them in a magazine. What can the clinician most accurately tell the man about the clinical use of tumor markers?
- A) "Tumor markers are a very useful screening tool, but they only exist for a very few types of cancer."
  - B) "Tests for the presence of tumor markers are limited by the fact that they are only accurate in the very early stages of cancer."
  - C) "Tumor markers are an excellent screening tool, but it's only practical to test for those cancers that you're at risk of."
  - D) "Tumor markers alone aren't enough to confirm whether you have cancer or not, so they're not a very useful screening tool."

Ans: D

**Feedback:**

As diagnostic tools, tumor markers have limitations. Nearly all markers can be elevated in benign conditions, and most are not elevated in the early stages of malignancy. Hence, tumor markers have limited value as screening tests. Furthermore, they are not in themselves specific enough to permit a diagnosis of a malignancy.

12. A 51-year-old female has been found to have a metastatic lesion in her lung, and her oncologist is unsure of the site of the primary tumor. Which of the following procedures is most likely to aid in this determination?
- A) Immunohistochemistry
  - B) Tumor markers
  - C) Microarray technology
  - D) Tissue biopsy

Ans: A

**Feedback:**

Immunohistochemistry can be used to determine the site of origin of metastatic tumors. In cases in which the origin of the metastasis is obscure, immunochemical detection of tissue-specific or organ-specific antigens can often help to identify the tumor source. Tumor markers, microarray technology, and biopsy are less likely to aid in identifying the primary source.

13. Which target of both chemotherapy and radiation treatment accounts for adverse as well as therapeutic effects?

- A) Cell surface receptors
- B) Circulating hormone levels
- C) Blood vessels
- D) Rapidly proliferating cells

Ans: D

**Feedback:**

Chemotherapy and radiation treatment both preferentially affect rapidly proliferating cells that include some normal body cells, such as epithelial and hair follicle cells, as well as cancer cells.

14. Upon entering the room of a 74-year-old client receiving brachytherapy for cervical cancer, you find the radiation implant and the position-holding device in the client's bed. What is the nurse's first best action?

- A) Assess the client's mental status.
- B) Use tongs to place the implant in the radiation container.
- C) Notify the physician and move the client to a different room.
- D) Don gloves and attempt to reposition the implant and positioning device.

Ans: B

**Feedback:**

To minimize staff radiation exposure, the rules of time, distance, and shielding come into play. If a radioactive device dislodges, there should be a lead container and tongs in the room, so the device can be safely stored until the radiology department can dispose of it safely.

15. A cancer patient has been prescribed 5-fluorouracil, an antimetabolite chemotherapy agent. This medication stops normal development and division by interrupting the S-phase of the cell cycle. When teaching this patient, the nurse explains that during the S-phase of the cell cycle,

- A) the cell is in a prolonged resting state and only leaves this state when cellular destruction is occurring.
- B) the DNA synthesis stops, but RNA synthesis continues.
- C) nuclear division occurs.
- D) the synthesis of DNA occurs, causing two separate sets of chromosomes to develop.

Ans: D

**Feedback:**

During the S-phase, DNA synthesis occurs, causing two separate sets of chromosomes to develop. Antimetabolites can cause abnormal timing of DNA synthesis. Because of their S-phase specificity, the antimetabolites are more effective when given as a prolonged infusion.

16. A 61-year-old male client is scheduled to begin chemotherapy for the treatment of his bone cancer shortly. Staff at the cancer center have educated the man and his wife about the goals, course, and expectations of his treatment. Which of the following medications and treatments might the man anticipate needing during and after his course of treatment?

- A) Analgesia and corticosteroids
- B) Antiemetics and packed red blood cell (PRBC) transfusions
- C) Whole blood transfusion and antiplatelet aggregators
- D) Diuretics and selective serotonin reuptake inhibitors (SSRIs)

Ans: B

**Feedback:**

Nausea and anemia are common side effects of chemotherapy and may be addressed with antiemetics and PRBCs. There is no noted indication with chemotherapy for corticosteroids, antiplatelet aggregators, diuretics, or SSRIs.

17. A patient with malignant melanoma has been prescribed alpha interferon, a biologic response modifier. Since this drug prolongs the cell cycle, increasing the percentage of cells in the G<sub>0</sub> phase, and stimulates NK cells and T-lymphocyte killer cells, the nurse can anticipate that he may experience which of the following common side effects?

- A) Fever, chills, and fatigue
- B) Nausea, vomiting, and diarrhea
- C) Opportunistic infections like Candida
- D) Renal damage with an increased creatinine level

Ans: A

**Feedback:**

Interferon is a biologic response modifier that changes a person's own immune response to cancer. This medication is given by injection, usually every other day. Because of stimulation of the body's natural immune response, the patient experiences extreme flulike symptoms.

18. An oncology nurse who has worked for many years providing care for children with cancer has taken a job on an adult oncology unit of a hospital. What differences might the nurse anticipate in this new job?

- A) There will be a greater number of cancers that are epithelial in origin.
- B) A greater proportion of the clients will have cancer that involves the hematopoietic system.
- C) The nurse will be working with more clients who have blastomas.
- D) More clients will be receiving treatment for leukemia.

Ans: A

**Feedback:**

Epithelial cancers are more common in adults, while “blastomas” and cancers of the hematopoietic system such as leukemia are more common in children.



19. A 26-year-old man who survived childhood acute lymphocytic leukemia (ALL), one of the most common childhood cancers, now complains of weakness, fatigue, and shortness of breath. His treatment for ALL likely included anthracyclines. What is the most likely cause of his symptoms?

A) Recurrence of ALL  
B) CNS problems resulting from childhood chemotherapy  
C) Heart failure resulting from childhood chemotherapy  
D) Hormonal dysfunction resulting from childhood chemotherapy

Ans: C

**Feedback:**

The patient's symptoms resemble those of congestive heart failure. The anthracyclines, such as doxorubicin and daunorubicin, are associated with the risk for developing cardiomyopathy and heart failure.

20. The mother of an 18-month-old child is concerned that her child is lethargic and is not eating foods that he normally enjoys. She takes him to the pediatrician for a check-up. Which of the following clinical manifestations would lead the health care provider to suspect the child may have a neuroblastoma? Select all that apply.

A) Large protruding abdomen  
B) Excessive burping  
C) Weight loss  
D) Large amount of pale urine  
E) Crying when position is changed

Ans: A, C, E

**Feedback:**

Neuroblastomas are the second most common solid malignancy in childhood after brain tumors. Clinical manifestations vary with the primary site (usually the adrenal glands) and include large abdominal masses, fever, and possibly weight loss. Bone pain suggests metastatic disease.

## Chapter 7- Stress and Adaptation

1. An 81-year-old male patient who has a diagnosis of orthostatic hypotension is experiencing an episode of particularly low blood pressure. The man's body has responded by increasing levels of angiotensin II in the bloodstream, a hormone that decreases the glomerular filtration rate in the kidneys and contributes to an increase in blood pressure. Which of the following phenomena best describes what has occurred?
- A) Positive feedback
  - B) Adaptation
  - C) Negative feedback
  - D) Homeostasis

Ans: C

**Feedback:**

his regulation and attempt to normalize blood pressure are an example of a negative feedback mechanism, in which physiological processes result in the maintenance of homeostasis. This process of normalization is not an example of positive feedback, and homeostasis is the goal rather than the process. This process involves adaptation, but negative feedback is a more precise characterization of the process.

2. A 61-year-old woman with a 40-pack-a year history of cigarette smoking and a diagnosis of chronic obstructive pulmonary disease (COPD) is experiencing an increase in arterial levels of CO<sub>2</sub>. This change has been detected in the client's medulla, aortic bodies, and carotid bodies, stimulating the inspiratory center in the medulla oblongata, which has in turn caused the diaphragm to contract more forcefully and increase the respiratory rate. Which of the following terms best describes the role of the inspiratory center?
- A) Integrator/comparator
  - B) Sensor
  - C) Effector
  - D) Feedback system

Ans: A

**Feedback:**

An integrator/comparator sums and compares incoming data with a set point. In this case, the inspiratory center has determined the need for increased respiration and stimulated the effector (diaphragm) to respond. The sensor role is in the client's medulla, aortic bodies, and carotid bodies. This overall process is an example of a feedback system, but this does not characterize the particular role of the inspiratory center.

3. Which of the following physiological processes would be considered a positive feedback mechanism?
- A) The release of antidiuretic hormone (ADH) from the posterior pituitary gland
  - B) Shivering in response to low environmental temperature
  - C) The platelet aggregation mechanism for closing minute ruptures in very small blood vessels during accidental injury
  - D) Increased production of white blood cells (WBCs) in response to a microorganism

Ans: C

**Feedback:**

The release of hormones during labor increases rather than mitigates a physiological system. Specifically, uterine contraction stimulates the production of other relevant hormones that cause temporary instability that culminates in childbirth. ADH counters the potential instability of insufficient hydration and/or blood pressure, much as shivering is an attempt to counter low temperature. Increased production of WBCs is a response to the potential homeostatic instability of an infectious process.

4. An occupational health officer who works in the context of a large police force is attempting to understand the role that stress may play in the health of his clients. According to Selye, which of the following statements best captures an aspect of the phenomenon of stress?
- A) The alarm stage involves the release of cortisol and catecholamines.
  - B) The nature of a stress response is determined by the objective severity of the stressor.
  - C) Systemic illnesses can sometimes result from the resistance stage of stress response.
  - D) Periods of stress can be developmentally positive or negative.

Ans: D

**Feedback:**

Selye noted that stress can result in positive growth and development, and that stress is not unanimously detrimental to health and development. The alarm stage is associated with the release of cortisol and catecholamines, and a stress response is dependent on properties of the stressor and the individual's conditioning; the severity is not objectively determined. Illness is often a consequence of the exhaustion stage.

5. An 80-year-old woman is slated for total hip replacement the following day and is experiencing a large amount of stress around her potential surgical outcomes. Which of the following is most likely to be uninvolved in the physiological response to her stress?
- A) Hypothalamus
  - B) Parathyroid
  - C) Adrenal cortex
  - D) Pituitary gland

Ans: B

**Feedback:**

The physiology of stress is associated with the hypothalamic–pituitary–adrenal axis. The parathyroid is not noted to be centrally involved in stress response.

6. A 45-year-old woman with a diagnosis of shingles is experiencing an acute onset of severe neuropathic pain. Which stage of Selye's characterization of stress response is the woman most likely experiencing at the moment?
- A) General adaptation syndrome (GAS)
  - B) Exhaustion
  - C) Alarm
  - D) Resistance

Ans: C

**Feedback:**

The stimulation of the sympathetic nervous system, such as that during an episode of pain, characterizes the alarm stage. Resistance and exhaustion would likely follow, and GAS encompasses the whole continuum, not just this particular stage.

7. When explaining to a patient admitted for stress-induced supraventricular tachycardia, the nurse will incorporate which of the following statements about what happens in the body as a result of excess stress?
- A) The primary role of the parasympathetic nervous system is to stimulate the vagus nerve.
  - B) The corticotropin-releasing factor stimulates the release of norepinephrine, which is responsible for “fight-or-flight” reaction to stress.
  - C) Endorphins are released from the brain every time we experience stress.
  - D) The pituitary gland is ultimately responsible for growth, metabolism, and maturation, all of which are important when the body is stressed.

Ans: B

**Feedback:**

Norepinephrine stimulates the secretion of CRF, and CRF stimulates the release of norepinephrine.

8. A student is attempting to trace the feedback cycle involved in the stress response. Which of the following neural structures is thought to be the central integrating site for the stress response?

- A) Hypothalamus
- B) Cerebral cortex
- C) Locus ceruleus
- D) Reticular formation

Ans: C

**Feedback:**

The locus ceruleus (LC) produces norepinephrine (NE), which initiates the autonomic syndrome known as “fight-or-flight.” The LC–NE system is connected to the hypothalamus, the limbic system, the hippocampus, and the cerebral cortex, which carry out the specific functions of the stress response.

9. A medical student is scheduled to undergo a clinical exam of his assessment skills under the supervision of the attending physician. As a result of this stressor, the student has high serum levels of glucocorticoid hormones such as cortisol. Which of the following statements best captures an aspect of the role of glucocorticoid hormones such as cortisol in the physiological response to stress?

- A) Blood glucose levels are increased in anticipation of energy expenditure.
- B) The immune system is bolstered in response to an impending threat.
- C) Osteoblast activity and protein synthesis are suppressed in order to refocus energy.
- D) Attention, arousal, and respiratory rate are increased in order to prepare for a response.

Ans: C

**Feedback:**

Cortisol suppresses osteoblast activity, hematopoiesis, protein and collagen synthesis, and immune responses with the goal of preserving energy for a fight-or-flight response. Blood glucose levels are stabilized, not increased, and the immune system is not prioritized in the stress response. Increased attention, arousal, and respiratory rate are the domain of the locus ceruleus–norepinephrine system.

10. The physician suspects that a patient under a lot of stress (stimulation of the sympathetic nervous system) is experiencing stress-induced release of vasopressin. Knowing the effects of an activated renin–angiotensin–aldosterone system (RAAS), the nurse should be assessing the patient for which primary nursing diagnosis?

- A) Fluid volume excess related to retention of water in the body
- B) Decreased cardiac output related to positional low blood pressure
- C) Electrolyte imbalance related to retention of potassium
- D) Nutritional imbalance related to vomiting and diarrhea

Ans: A

**Feedback:**

Activation of the RAAS results in an increase in vascular tone (elevation of BP) and renal retention of sodium and water. These changes contribute to the physiologic changes that occur with the stress response.

11. A patient who has been awaiting the results of a bone marrow biopsy for several days is experiencing stress as a result of uncertainty and the possibility that abnormal cell growth may be detected. A physical examination and blood work would most likely yield which of the following results?

- A) Increased respiratory rate; increased levels of testosterone
- B) Increased blood pressure and heart rate; increased antidiuretic hormone (ADH)
- C) Pupil dilation; increased somatomedin C
- D) Increased gastrointestinal motility; decreased thyroid-stimulating hormone

Ans: B

**Feedback:**

Increases in ADH, blood pressure, and heart rate are all associated with the stress response. Testosterone and somatomedin C are decreased in prolonged stress exposure. Gastrointestinal motility is decreased, not increased, during stress.

12. A female patient with a recent diagnosis of systemic lupus erythematosus (SLE) has been told that this is an autoimmune disease whereby the immune system is attacking the body's cells and tissues. She knows that she has inflammation and tissue damage. She asks her nurse to explain "What cells in the body are triggering this inflammation?" The nurse responds that
- A) mainly the adrenocorticoids like cortisone are responsible for all your inflammation.
  - B) mineralocorticoids like aldosterone usually begin the process of inflammation.
  - C) the lymphocytes that migrate to the brain, where they secrete cytokines, which trigger inflammation.
  - D) primarily, this acute stress reaction is associated with stimulation of the autonomic nervous system that causes stiffness in the joints.

Ans: C

**Feedback:**

Immune cells such as monocytes and lymphocytes can penetrate the blood–brain barrier and take up residence in the brain, where they secrete chemical messengers called cytokines that influence the stress response. This triggers inflammation.

13. An electrician who has been working 14 to 16 hour/day for several weeks in order to ensure the financial survival of his business presents to his family physician with complaints of persistent headaches and insomnia. His family physician attributes the physical complaints to the ongoing stress that the man has been undergoing. Which of the following factors has most likely contributed the most to the man's response to this stressful period of his life?
- A) The fact that he has previously had difficulty coping with stress
  - B) The fact that he is not physically active on a regular basis
  - C) The fact that his company is heavily in debt
  - D) The fact that he takes diuretic medication for his hypertension

Ans: A

**Feedback:**

An individual's subjective response to stress is closely linked to previous experiences in dealing with stress and the presence or absence of coping mechanisms. Physical activity, subjective financial status, and diuretic medications would be less likely to have as great an effect.

14. A widow, who lost her husband a few weeks ago, is having trouble with insomnia and maintaining her normal sleep pattern. When visiting with her health care provider, he suggests a prescription to help regain her normal circadian pattern. This is based on the fact that interruption of sleep–wake cycles can cause which of the following problems? Select all that apply.

- A) Hallucinations that may result in harm to the individual
- B) Alterations in the immune function that can result in an infection
- C) Excess of non–rapid eye movement (NREM) sleep that affects the creativity process
- D) An increased risk in accidents when sleep deprived similar to those under the influence of alcohol
- E) Restless leg syndrome due to inability to find a comfortable sleeping position

Ans: B, D

**Feedback:**

Sleep disorders and alterations in the sleep–wake cycle have been shown to alter immune function, normal hormone secretion, and physical and psychological functioning. However, hallucinations are not associated with sleep deprivations. With sleep disorders, the REM sleep cycle decreases, affecting creativity and forming associations. Restless leg syndrome is not associated with insomnia.

15. A patient with Parkinson disease has challenged himself to maintain mobility for longer than the physician predicts. He strives every day to walk 5 to 10 steps further than the day before. This phenomenon, being researched by social psychologists, is known as

- A) stubbornness.
- B) assertiveness.
- C) hardiness.
- D) positivism.

Ans: C

**Feedback:**

Hardiness describes a personality characteristic that includes a sense of having control over the environment, a sense of having a purpose in life, and an ability to conceptualize stressors as a challenge rather than a threat.



16. Which of the following patients, when faced with acute stressful situations, would be considered at highest risk for becoming noncompliant with their medication regimen?
- A) End-stage renal failure patient experiencing electrolyte imbalances related to having trouble sticking to his prescribed diet
  - B) Teenager whose period is late by 2 weeks and afraid to tell her parents
  - C) Paraplegic patient who forgot his pressure control device and has a small decubitus on his coccyx
  - D) New mother who is breast-feeding every 2 to 3 hours throughout the day and night.

Ans: A

**Feedback:**

For people with health problems (like ESRD patients), acute stress can interrupt compliance with medication regimens and exercise programs.

17. Based on the assessment results, which of the following hospital patients is most likely to be experiencing the effects of chronic stress?
- A) A 32-year-old intravenous drug user with a diagnosis of endocarditis
  - B) A 45-year-old paraplegic who is experiencing delayed wound healing of an ischial ulcer
  - C) A 79-year-old woman who has a diagnosis of acute and chronic renal failure
  - D) A 63-year-old man with a diagnosis of chronic obstructive pulmonary disease (COPD) and heart failure (HF)

Ans: B

**Feedback:**

Delayed wound healing has been associated with chronic stress. Endocarditis, renal failure, COPD, and CHF are not noted as common effects of chronic stress.

18. A counseling psychologist is working with a 30-year-old female client who is experiencing the symptoms of posttraumatic stress disorder (PTSD) following a house fire several months prior. Which of the client's following diagnostic results could most likely be interpreted as a manifestation of PTSD?
- A) The client has decreased levels of cortisol.
  - B) The client has decreased levels of norepinephrine.
  - C) The client has decreased levels of angiotensin II.
  - D) The client has increased levels of growth hormones.

Ans: A

**Feedback:**

Decreased cortisol levels are a marker of PTSD and a differentiation from other subtypes of stress. Low levels of norepinephrine and angiotensin II would not accompany any common variant of stress response, and growth hormones are suppressed in response to stress.

19. During a period of stress, the nurse asks the patient to close his eyes and think of a calm, relaxing place where he can feel the wind blowing on his cheek and smell the salty air from the ocean. This is an example of utilizing which type of treatment for stress reduction?

A) Hypnosis  
B) Guided imagery  
C) Yoga  
D) Biofeedback

Ans: B

**Feedback:**

Guided imagery is another technique that is used to achieve relaxation. One method is scene visualization, in which the person is asked to sit back, close the eyes, and concentrate on a scene narrated by the therapist. Whenever possible, all five senses are involved.

20. A health care professional has recommended biofeedback to a client as a method of dealing with the high levels of stress in her life. Which of the following explanations best characterizes an aspect of biofeedback treatment?

A) "You might be asked to use an electrocardiogram as part of the therapy."  
B) "The goal is to make you aware of your physiological processes."  
C) "You'll hopefully be able to gain control over skeletal muscle contractions."  
D) "You'll become aware of the increased skin temperature that accompanies anxiety."

Ans: C

**Feedback:**

The goal of biofeedback is to gain control over muscle contractions that accompany anxiety and tension. Electrocardiograms are not used in biofeedback, and control, rather than simply awareness, is the ultimate goal. Skin temperature decreases, not increases, with anxiety.

## Chapter 8-a- Disorders of Fluid and Electrolyte Balance

1. During a period of extreme excess fluid volume, a renal dialysis patient may be administered which type of IV solution to shrink the swollen cells by pulling water out of the cell?
  - A) 0.9% sodium chloride
  - B) 5% dextrose and water
  - C) 3% sodium chloride
  - D) Lactated Ringer solution

Ans: C

### Feedback:

When cells are placed in a hypotonic solution, which has a lower effective osmolality than the ICF, they swell as water moves into the cell, and when they are placed in a hypertonic solution, which has a greater effective osmolality than the ICF, they shrink as water is pulled out of the cell.

2. A 34-year-old male client has diagnoses of liver failure, ascites, and hepatic encephalopathy secondary to alcohol abuse. The client's family is questioning the care team as to why his abdomen is so large even though he is undernourished and emaciated. Which of the following statements most accurately underlies the explanation that a member of the care team would provide the family?
  - A) An inordinate amount of interstitial fluid is accumulating his abdomen.
  - B) The transcellular component of the intracellular fluid compartment contains far more fluid than normal.
  - C) Normally small transcellular fluid compartment, or third space, is becoming enlarged.
  - D) Gravity-dependent plasma is accumulating in his peritoneal cavity.

Ans: C

### Feedback:

Ascites is characterized by an accumulation of fluid in the transcellular component of the ECF, not ICF. The fluid is not categorized as belonging to the plasma component of the ECF.

3. Which of the following individuals would be considered to be at risk for the development of edema? Select all that apply.
- A) An 81-year-old man with right-sided heart failure and hypothyroidism
  - B) A 60-year-old obese female with a diagnosis of poorly controlled diabetes mellitus
  - C) A 34-year-old industrial worker who has suffered extensive burns in a job-related accident
  - D) A 77-year-old woman who has an active gastrointestinal bleed and consequent anemia
  - E) A 22-year-old female with hypoalbuminemia secondary to malnutrition and anorexia nervosa

Ans: A, C, E

**Feedback:**

Right-sided heart failure, burns, and low levels of plasma proteins are all associated with the development of edema. Diabetes and GI bleeds are not identified as contributors to edema.

4. Recognizing the prevalence and incidence of dehydration among older adults, a care aide at a long-term care facility is in the habit of encouraging residents to drink even though they may not feel thirsty at the time. Which of the following facts underlies the care aide's advice?
- A) Older adults often experience a decrease in the sensation of thirst, even when serum sodium levels are high.
  - B) The metabolic needs for both fluid and sodium in older adults differ from those of younger individuals.
  - C) Regulation and maintenance of effective circulating volume by the kidneys is less effective in the elderly.
  - D) The renin–angiotensin–aldosterone system (RAAS) is less able to facilitate sodium clearance in older adults.

Ans: A

**Feedback:**

The elderly are prone to hypodipsia even when osmolality and serum sodium levels are elevated, a fact that is compounded by sensory and/or neurological deficits. Hypodipsia in the elderly is not related to differing metabolic needs, ineffective kidney function, or compromise of the RAAS.

5. The nurse is providing teaching to a student nurse about how antidiuretic hormone (ADH) plays a central role in the reabsorption of water by the kidneys. The nursing student is correct to place the following components of the homeostatic action of ADH in the correct sequence. Use all the options.
- A) Stored ADH is released into circulation.
  - B) ADH is transported along a neural pathway to the posterior pituitary gland.
  - C) Aquaporins are inserted into tubular cell membranes.
  - D) ADH is synthesized by cells in the supraoptic and paraventricular nuclei of the hypothalamus.
  - E) Serum osmolality increases.

Ans: D, B, E, A, C

**Feedback:**

ADH is produced in the hypothalamus, sequestered in the pituitary, and is released in response to increased serum osmolality. Its influence on tubular cells is exerted by way of the insertion of aquaporins in the tubular membrane.

6. A patient arrives in the ED very hypovolemic related to excretion of “at least 3 gallon jugs of urine in the past 24 hours.” He describes the urine as being clear-like water. The physician suspects diabetes insipidus. The nurse should be prepared to administer which of the following medications?
- A) Desmopressin acetate (DDAVP)
  - B) Benadryl, an anticholinergic
  - C) Calcium gluconate
  - D) Prednisone

Ans: A

**Feedback:**

Diabetes insipidus is caused by a deficiency of or a decreased response to ADH. The preferred drug for treating chronic DI is desmopressin acetate (DDAVP).

7. A patient has been diagnosed with a brain tumor that cannot be removed surgically. During each office visit, the nurse will be assessing the patient for syndrome of inappropriate antidiuretic hormone (SIADH). Which of the following assessments would alert the clinic nurse that the patient may be developing this complication?
- A) Complaints that his urine output is decreased, no edema noted in ankles, and increasing headache
  - B) Elevated blood glucose levels, dry mucous membranes, and severe projectile vomiting
  - C) Fever, diarrhea, and nausea
  - D) Muscle cramps, pins and needle sensation around the mouth/lips, and unexplained bruising

Ans: A

**Feedback:**

SIADH manifests as a dilutional hyponatremia. Decrease urine output, absence of edema, and headaches are signs of this. Answer choice B relates to s/s of diabetes insipidus; answer choice C is indicative of common flu s/s; answer choice D is relates to s/s of hypocalcemia.

8. A 77-year-old female hospital patient has contracted *Clostridium difficile* during her stay and is experiencing severe diarrhea. Which of the following statements best conveys a risk that this woman faces?
- A) She is susceptible to isotonic fluid volume deficit.
  - B) She is prone to isotonic fluid volume excess.
  - C) She could develop third-spacing edema as a result of plasma protein losses.
  - D) She is at risk of compensatory fluid volume overload secondary to gastrointestinal water and electrolyte losses.

Ans: A

**Feedback:**

This woman is at risk of isotonic fluid volume deficit and sodium imbalances as a result of her diarrhea. She is not likely to develop fluid volume excess or third spacing as consequences of diarrhea.

9. You are volunteering in the medical tent of a road race on a hot, humid day. A runner who has collapsed on the road is brought in with the following symptoms: sunken eyes, a body temperature of 100°F, and a complaint of dizziness while sitting to have his blood pressure taken (which subsides upon his lying down). These are signs of a fluid volume deficit. Which of the following treatments should be carried out first?
- A) Offer water by mouth.
  - B) Begin cooling of his body by ice packs.
  - C) Give him a transfusion of FFP.
  - D) Give him an electrolyte solution by mouth.

Ans: D

**Feedback:**

Fluid volume deficit results in postural hypotension (dizziness while upright) due to decreased blood volume. Sunken eyes and elevated temperature also point to a fluid volume deficit. The most important action to take is to replace fluid; however, pure water would be a mistake, since without accompanying electrolytes such as sodium, hyponatremia (water retention and a decrease in serum osmolality) could result. Thus, an oral electrolyte solution is recommended; in more severe cases, an IV would be appropriate.

10. A client is brought to the emergency department with complaints of shortness of breath. Assessment reveals a full, bounding pulse, severe edema, and audible crackles in lower lung fields bilaterally. What is the client's most likely diagnosis?
- A) Hyponatremia
  - B) Fluid volume excess
  - C) Electrolyte imbalance: hypocalcemia
  - D) Hyperkalemia

Ans: B

**Feedback:**

Peripheral and pulmonary edema as well as a bounding pulse and dyspnea are indicators of fluid volume overload.

11. A 26-year-old male patient with a diagnosis of schizophrenia has been admitted with suspected hyponatremia after consuming copious quantities of tap water. Given this diagnosis, what clinical manifestations and lab results should the nurse anticipate the patient will exhibit?

A) High urine specific gravity, tachycardia, and a weak, thready pulse  
B) Low blood pressure, dry mouth, and increased urine osmolality  
C) Increased hematocrit and blood urea nitrogen and seizures  
D) Muscle weakness, lethargy, and headaches.

Ans: D

**Feedback:**

Weakness, lethargy, and nausea are noted manifestations of hyponatremia. High urine specific gravity, tachycardia, and a weak, thread pulse are associated with hypernatremia, while low blood pressure, fever, and increased urine osmolality are manifestations of fluid volume deficit. Increased hematocrit and blood urea nitrogen and seizures are also associated with hypernatremia.

12. An ECG technician is performing an ECG on a hospital patient who has developed hypokalemia secondary to diuretic use. Which of the following manifestations of the client's health problem will the technician anticipate on the ECG?

A) Irregular heart rate and a peaked T wave  
B) A low T wave and an absent P wave  
C) A prominent U wave and a flattened T wave  
D) A narrow QRS complex and an absent U wave

Ans: C

**Feedback:**

ECG changes associated with hypokalemia include a prominent U wave and a flattening of the T wave. Atrial fibrillation, a low P wave, and the absence of a U wave are not associated with hypokalemia.



13. A nurse in a medical unit has noted that a client's potassium level is elevated at 6.1 mEq/L. The nurse has notified the physician, removed the banana from the client's lunch tray, and is performing a focused assessment. When questioned by the client for the rationale for these actions, which of the following explanations is most appropriate?
- A) "Your potassium level is high, and so I need you let me know if you feel numbness, tingling, or weakness."
  - B) "Your potassium levels in the blood are higher than they should be, which brings a risk of changes in the brain function."
  - C) "I'll need to monitor you today for signs of high potassium; tell me if you feel as if your heart is beating quickly or irregularly."
  - D) "The amount of potassium in your blood is too high, but this can be resolved by changing the intravenous fluid you are receiving."

Ans: A

**Feedback:**

Paresthesia and muscle weakness are manifestations of hyperkalemia. Tachycardia and dysrhythmias are more commonly associated with hypokalemia, and the greatest risks associated with potassium imbalances are cardiac rather than neurological. Hyperkalemia is not normally resolved by correction using IV fluid.

14. A renal failure patient with severe hyperkalemia ( $K^+$  level 7.2 mEq/L) has just been admitted to the nursing unit. Given the severity of this situation, the nurse should be prepared to administer which intravenous infusion stat?
- A) Lactated Ringer solution at 150 mL/hour to maintain blood glucose levels
  - B) Regular insulin infusion, rate dependent on lab values
  - C) Infusion of Solu-Medrol to decrease irritation to the intravascular system
  - D) Dilaudid via patient-controlled device (PCA) to control pain

Ans: B

**Feedback:**

The administration of sodium bicarbonate,  $\beta$ -adrenergic agonists, or insulin distributes potassium into the ICF compartment and rapidly decreases the ECF concentration. Lactated Ringer solution, steroids, or narcotics will not help to lower potassium levels.

15. Vitamin D is integral to the regulation of calcium and phosphate levels. Put the following steps in the action of vitamin D into the correct sequence. Use all the options.
- A) Vitamin D is present in the skin or intestine.
  - B) Vitamin D is concentrated in the liver.
  - C) Absorption of calcium from the intestine increases.
  - D) Vitamin D is transported to the kidneys.
  - E) Calcitriol is produced.

Ans: A, B, D, E, C

**Feedback:**

Vitamin D is either synthesized in the skin by ultraviolet exposure or obtained from the intestines following ingestion. It is then concentrated in the liver and transported to the kidneys

16. A 52-year-old patient has just passed a kidney stone and has high levels of calcium in her urine. Blood tests show high levels of calcium in her blood as well. What subsequent lab results would be most likely to distinguish between primary hyperparathyroidism and hypercalcemia of malignancy?

- A) Parathyroid hormone level
- B) Bone scan
- C) Plasma phosphate levels
- D) Serum magnesium level

Ans: A

**Feedback:**

Hyperparathyroidism, in which parathyroid hormone is secreted in excess, may be caused by a parathyroid adenoma. Since parathyroid hormone mobilizes calcium from bone and promotes its transfer to the extracellular fluid, excess calcium is excreted in the urine (promoting the development of kidney stones) and is evident in the plasma. In primary hyperparathyroidism, antibody binding assays of intact PTH would reveal either normal or elevated parathyroid hormone in the face of hypercalcemia, whereas in hypercalcemia of malignancy, levels of intact PTH are suppressed.

17. An 81-year-old female has a long-standing diagnosis of hypocalcemia secondary to kidney disease. She will be moving into an assisted living facility shortly. Which of the following clinical manifestations would the nursing staff at the facility likely observe in this patient?

- A) Loss of appetite and complaints of nausea
- B) Muscular spasms and complaints of tingling in the hands/feet
- C) High fluid intake and copious amounts of dilute urine output
- D) Lethargy and change in level of consciousness

Ans: B

**Feedback:**

Muscular spasms and cramping are common manifestations of low serum calcium. Polydipsia, polyuria, anorexia, lethargy, and stupor are associated with hypercalcemia.

18. A terminally ill cancer patient with metastasis to the bone has been admitted with elevated calcium levels (hypercalcemic crisis). The patient is very lethargic and exhibiting muscle flaccidity. The nurse should be prepared to administer (Select all that apply.)

- A) pamidronate, a bisphosphonate.
- B) intravenous drip of insulin.
- C) furosemide, a loop diuretic.
- D) gallium nitrate, a gallium salt of nitric acid.
- E) prednisone, a corticosteroid.

Ans: A, D, E

**Feedback:**

The bisphosphonates (*e.g.*, pamidronate, zoledronate), which act mainly by inhibiting osteoclastic activity, provide a significant reduction in calcium levels with relatively few side effects. Calcitonin also inhibits osteoclastic activity. Gallium nitrate is highly effective in the treatment of severe hypercalcemia associated with malignancy. Prednisone, a corticosteroid, inhibits bone resorption.

19. A 56-year-old female hospital patient with a history of alcohol abuse is receiving intravenous (IV) phosphate replacement. Which of the following health problems will this IV therapy most likely resolve?

- A) The client has an accumulation of fluid in her peritoneal cavity.
- B) The client is acidotic and has impaired platelet function.
- C) The client has an irregular heart rate and a thread pulse.
- D) The client has abdominal spasms and hyperactive reflexes.

Ans: B

**Feedback:**

Phosphate is necessary for the normal function of platelets and the excretion of hydrogen ions that contribute to acidosis. Phosphate replacement would be unlikely to resolve ascites and cardiac anomalies, while abdominal spasms and hyperactive reflexes are more likely consequences of low calcium levels.

20. A patient who has had a prolonged period of nasogastric (NG) suctioning following colon surgery is experiencing electrolyte imbalances. The magnesium level is low (1.2 mg/dL). Knowing that magnesium deficiency occurs in conjunction with low calcium levels, the nurse should assess the patient for which of the following clinical manifestations of hypocalcaemia? Select all that apply.

- A) Personality changes
- B) Hyperactive reflexes
- C) Increase in ventricular arrhythmias
- D) Increase in bouts of atrial fibrillation
- E) Symptomatic hypotension

Ans: A, B, C

**Feedback:**

Hypocalcaemia may be evidenced by personality changes and neuromuscular irritability along with tremors, choreiform movements, and positive Chvostek or Trousseau signs. Cardiovascular manifestations include tachycardia, hypertension, and ventricular dysrhythmias.

## Chapter 8-b- Disorders of Acid-Base Balance

1. A male patient with a history of heavy alcohol use has been admitted to hospital for malnutrition and suspected pancreatitis. The patient's diagnostic workup suggests alcoholic ketoacidosis as a component of his current health problems. He is somewhat familiar with the effect that drinking has had on his nutrition and pancreas but is wholly unfamiliar with the significance of acid–base balance. How best could his care provider explain the concept to him?
  - A) “The chemical processes that take place throughout your body are thrown off very easily when your body is too acidic or not acidic enough.
  - B) “The multitude of chemical reactions that take place in your body depend on your body fluids being slightly acidic.”
  - C) “The healthy function of your kidneys and your lungs requires a specific level of pH in your body.”
  - D) “Your body is highly dependent on what food and fluid you consume to keep itself at a functioning level of slight nonacidity.”

Ans: A

**Feedback:**

Metabolic activity is highly contingent on a narrow range of pH. Normal pH is slightly basic, not acidic, and appropriate pH is maintained by the lungs and kidneys, not vice versa. The action of the respiratory and renal systems, not particular food or fluid intake, has the most salient effect on the acid–base balance.

2. When explaining how carbon dioxide combines with water to form carbonic acid as part of acid–base lecture, the faculty instructor emphasized that which enzyme is needed as a catalyst for *this reaction*?
  - A) Carbonic anhydrase
  - B) Phenylalanine hydroxylase
  - C) Hydrolases
  - D) Trypsin

Ans: A

**Feedback:**

Although  $\text{CO}_2$  is a gas and not an acid, a small percentage of the gas combines with water to form  $\text{H}_2\text{CO}_3$ . The reaction that generates  $\text{H}_2\text{CO}_3$  from  $\text{CO}_2$  and water is catalyzed by an enzyme called carbonic anhydrase.

3. A 31-year-old client with a diagnosis of end-stage liver failure has been admitted to the intensive care unit of a hospital. Arterial blood sampling indicates that the man has an acid–base imbalance. Which of the following situations is most likely to result in an inappropriate pH?
- A) Conservation or formation of new  $\text{HCO}_3^-$  by the kidneys
  - B) Low albumin and plasma globulin levels
  - C) Transcompartmental exchange of  $\text{H}^+$  and potassium ions
  - D) Renal excretion of  $\text{HCO}_3^-$  in the presence of excess base

Ans: B

**Feedback:**

Albumin and plasma globulins are key protein buffers in the vascular compartment; consequently, a low albumin level, as is common in liver failure, is apt to result in acid–base imbalances. Answer choices A, C, and D all convey normal physiological processes that help to maintain pH.

4. A patient with ESRD comes into the emergency department in severe acidosis. The nurse notes that the respiratory rate is 36 breaths/minute. The nurse understands the pathophysiology of this response and explains to the student nurse that the patient's
- A) anxiety level is high, and the body is trying to release endorphins.
  - B) chemoreceptors in the carotid and aortic bodies have noticed the pH change and altered the ventilator rate.
  - C) kidneys are not able to buffer the acid and require the help from the lungs.
  - D) lungs are trying to excrete excess hydrogen.

Ans: B

**Feedback:**

The second line of defense against acid–base disturbances is the control of extracellular  $\text{CO}_2$  by the lungs. Blood  $\text{PCO}_2$  and pH are important regulators of ventilation. Chemoreceptors in the brain stem and the peripheral chemoreceptors in the carotid and aortic bodies sense changes in  $\text{PCO}_2$  and pH and alter the ventilatory rate.

5. Place the following stages of the hydrogen ion elimination and bicarbonate conservation in the proximal tubules of the nephrons in the ascending chronological order. Use all the options.
- A)  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are produced.
  - B)  $\text{H}^+$  is secreting into the tubular fluid.
  - C) Carbonic acid is produced.
  - D)  $\text{H}^+$  combines with filtered  $\text{HCO}_3^-$ .

Ans: B, D, C, A

**Feedback:**

Renal regulation of pH involves the secretion of hydrogen ions into the tubular fluid, the combining of hydrogen ions with bicarbonate yielding carbonic acid, followed by the decomposition of carbonic acid into carbon dioxide and water.

6. Following several days in an acidotic state, a hospital patient has returned to desired pH. Which of the following processes could have contributed to the resolution of the patient's health problem?

A) Exchange of  $\text{Na}^+$  and  $\text{H}^+$  ions  
B) Selective renal secretion and reabsorption of  $\text{CO}_2$   
C) The phosphate and ammonia buffer systems in the renal tubules  
D) Excretion of  $\text{HCO}_3^-$  by the kidneys

Ans: C

**Feedback:**

The phosphate and ammonia buffer systems are secondary, but important, processes that contribute to the maintenance of appropriate pH. The kidneys must reabsorb nearly all the body's stores of  $\text{HCO}_3^-$  to maintain homeostasis, and they are not involved in  $\text{CO}_2$  control. Hydrogen–potassium exchange, not hydrogen–sodium exchange, is a component of acid–base control.

7. When trying to explain the role of potassium and hydrogen related to acid–base balance, which of the following statements is accurate?

A) Hypokalemia stimulates  $\text{H}^+$  secretion.  
B) Hyperkalemia will cause the reabsorption of  $\text{HCO}_3^-$ .  
C) Acidosis causes an increase in  $\text{K}^+$  elimination.  
D) Alkalosis tends to increase  $\text{H}^+$  elimination.

Ans: A

**Feedback:**

Hypokalemia is a potent stimulus for  $\text{H}^+$  secretion and  $\text{HCO}_3^-$  reabsorption. Acidosis tends to increase  $\text{H}^+$  elimination and decrease  $\text{K}^+$  elimination, with a resultant increase in plasma potassium levels, whereas alkalosis tends to decrease  $\text{H}^+$  elimination and increase  $\text{K}^+$  elimination, with a resultant decrease in plasma  $\text{K}^+$  levels.

8. A client with poorly controlled diabetes mellitus presents to the emergency department with suspected ketoacidosis. Which of the following diagnostic results would most likely confirm this diagnosis?

A) Low  $\text{O}_2$  levels, increased anion gap, base excess  
B) High ammonia levels, decreased anion gap, high potassium  
C) Increased anion gap, base deficit  
D) Decreased anion gap, decreased urine ammonium level

Ans: C

**Feedback:**

Increased  $\text{CO}_2$  levels, an increased anion gap, and a base deficit are all associated with an acidotic state. Base excess, low oxygen, high potassium, high ammonia, and decreased anion gap would not suggest acidosis.

9. A patient who has just had her first postoperative dinner out to celebrate her recovery from an intestinal bypass is brought to the emergency room by her spouse. He reports that the patient seems disoriented and is slurring her words. The patient did not have any alcohol with her pasta dinner. Which of the following might be the cause of her symptoms?

A) Ketoacidosis  
B) Lactic acidosis  
C) Hypercapnia  
D) Hypothalemia

Ans: B

**Feedback:**

A unique form of lactic acidosis, called D-lactic acidosis, can occur in persons with intestinal disorders that involve the generation and absorption of D-lactic acid. D-lactic acidosis can occur in persons with jejunoileal bypass, in which there is impaired reabsorption of carbohydrate in the small intestine. Persons with D-lactic acidosis experience episodic periods of metabolic acidosis often brought on by eating a meal high in carbohydrates. Manifestations include confusion, cerebellar ataxia, slurred speech, and loss of memory. They may complain of feeling (or may appear) intoxicated.

10. The nurse is caring for a patient with ketoacidosis, who is complaining of increasing lethargy and occasional confusion following several weeks of rigid adherence to a carbohydrate-free diet. The nurse understands which of the following phenomena is most likely occurring?
- A) High-fat, low-carbohydrate dietary intake is associated with respiratory acidosis.  
B) In the absence of carbohydrate energy sources, her body is metabolizing fat and releasing ketoacids.  
C) Metabolism of dietary fats without the buffer action of carbohydrates results in the catabolism of ketoacids.  
D) Decreased carbohydrate intake induces insulin deficiency and consequent ketoacidosis.

Ans: B

**Feedback:**

Low-carbohydrate diets can induce the fat metabolism and consequent metabolic acidosis that is more commonly associated with diabetic ketoacidosis. The acidotic state is not classified as respiratory in nature and does not involve a buffer role for carbohydrates or insulin deficiency.



11. A 14-year-old boy, appearing to be intoxicated, is brought to the emergency room by ambulance. The EMTs report that the boy has denied consuming anything out of the ordinary, but an open antifreeze container was found in the boy's room. Which of the following is likely to be used to treat the patient's symptoms?

A) Gastric lavage  
B) Syrup of ipecac  
C) Fomepizole  
D) Sodium bicarbonate

Ans: C

**Feedback:**

Ethylene glycol is found in products ranging from antifreeze and deicing solutions to carpet and fabric cleaners. It tastes sweet and is intoxicating—the factors that contribute to its abuse potential. A lethal dose is approximately 100 mL. It is rapidly absorbed from the intestine, making treatment with either gastric lavage or syrup of ipecac ineffective. Fomepizole, with specific indications for ethylene glycol poisoning, was recently approved by the U.S. Food and Drug Administration.

12. A patient who overdosed on aspirin is brought to the emergency department. The nurse caring for this patient should anticipate which of the following clinical manifestations? Select all that apply.

A) Respiratory rate of 40  
B) BP 100/72  
C) ABG report: pH 7.50, PCO<sub>2</sub> 31 mm Hg, and HCO<sub>3</sub> level 19 mmol/L.  
D) Urine output approximately 100 mL/hour  
E) Bilateral crackles (fluid) in the lungs

Ans: A, C

**Feedback:**

The salicylates cross the blood–brain barrier and directly stimulate the respiratory center, causing hyperventilation and respiratory alkalosis (answer choices A and C). The blood pressure is at normal range, and the urine output is normal or excessive depending on fluid intake. Bilateral crackles (fluid) in the lungs are usually a sign of heart failure.

13. Which of the following individuals are at risk of developing metabolic alkalosis? Select all that apply.

- A) A 70-year-old woman who has taken two tablespoons of baking soda to settle her "sour stomach"
- B) A hospital patient who is on nasogastric suction following gastric surgery
- C) A 20-year-old male who has been regularly inducing himself to vomit following binge eating
- D) A 33-year-old male patient who is on mechanical ventilation in the intensive care unit following a head injury
- E) A 58-year-old alcoholic male who has been foregoing food for several weeks while drinking heavily
- F) A 60-year-old female who has chronic renal failure secondary to hypertension

Ans: A, B, C

**Feedback:**

Ingestion of bicarbonate, gastric suction, and vomiting are causes of metabolic alkalosis. Patients on mechanical ventilation are at risk of respiratory alkalosis, while heavy alcohol use and renal failure are associated with acidosis.

14. A 55-year-old male client with a history of cardiovascular disease has been admitted to the intensive care unit after recovering from cardiogenic shock. In the hours since admission, the client's arterial blood gases indicate acidosis, most likely acute lactic acidosis. Which of the following signs, symptoms, and diagnostic findings might his care team anticipate before the acid–base balance is restored? Select all that apply.

- A) Decreased pH
- B) Cardiac dysrhythmias
- C) Decreased alertness and cognition
- D) Hypoventilation
- E) Nausea and vomiting

Ans: A, B, C, E

**Feedback:**

As with any form of acidosis, pH is apt to be lower than normal. Metabolic acidosis is also associated with dysrhythmias, decreased alertness, and nausea and vomiting. Respiration is likely to be increased in both rate and depth.

15. A nurse is providing care for a client who has been diagnosed with metabolic alkalosis after several days of antacid use. Which of the following treatments should the nurse prepare to give?

- A) Intravenous or oral administration of free hydrogen ions
- B) Intravenous administration of KCl solution
- C) Administration of oxygen and  $\text{NaHCO}_3$  solution
- D) Supplementary oxygen and possible mechanical ventilation

Ans: B

**Feedback:**

KCl administration facilitates the renal retention of hydrogen ions, resulting in lowering of pH. It is not possible to administer free  $\text{H}^+$  ions, and sodium bicarbonate would exacerbate her condition. Mechanical ventilation is indicated in cases of respiratory acidosis.

16. A hospital patient's arterial blood gases indicate normal levels of oxygen and increased carbon dioxide. The patient's respiratory rate is 12 breaths/minute (normal 14 to 20 breaths/minute) with all other vital signs within normal range. While not evident from assessment and diagnostics, the patient's kidneys are minimizing both  $\text{H}^+$  excretion and  $\text{HCO}_3^-$  reabsorption. What is this client's most likely diagnosis?

- A) Respiratory alkalosis
- B) Metabolic acidosis
- C) Respiratory acidosis
- D) Metabolic alkalosis

Ans: D

**Feedback:**

In response to increased bicarbonate, the client is hypoventilating to increase carbon dioxide partial pressure. As well, renal compensation is aimed at lowering pH by both reducing  $\text{H}^+$  excretion and  $\text{HCO}_3^-$  reabsorption. The given data are incongruent with the other major acid-base imbalances.

17. A 77-year-old female diagnosed with chronic obstructive pulmonary disease (COPD) is experiencing impaired gas exchange and CO<sub>2</sub> retention, despite a rapid respiratory rate. Which of the following pathophysiological principles would her health care team expect if her compensatory mechanisms are working?
- A) Arterial blood gas sampling indicates a pH in the range of 7.45 to 7.55.
  - B) Her kidneys are likely to reabsorb H<sup>+</sup> and secrete HCO<sub>3</sub><sup>-</sup>
  - C) Her body will produce excess metabolic CO<sub>2</sub>.
  - D) Her kidneys will adapt with an increase in plasma HCO<sub>3</sub><sup>-</sup> and her pH will decrease.

Ans: D

**Feedback:**

Respiratory acidosis is accompanied by renal adaptation with a more marked increase in plasma HCO<sub>3</sub><sup>-</sup> and a lesser decrease in pH. Her pH is likely below 7.35, and the likely renal response involves the reabsorption of HCO<sub>3</sub><sup>-</sup> and secretion of H<sup>+</sup>. Excess CO<sub>2</sub> production is not a common manifestation of obstructive lung disease.

18. The ICU nurse is concerned with her patient's arterial blood gas (ABG) results—especially the pH 7.30; and PCO<sub>2</sub> 49 mm Hg. The nurse interprets these ABG results to mean respiratory acidosis. The nurse knows which of the following are clinical manifestations of respiratory acidosis? Select all that apply.
- A) Headache with complaints of blurred vision
  - B) Muscle twitching
  - C) Hyperactive deep tendon reflexes
  - D) Complaints of paresthesia sensations around the lips/mouth
  - E) Numbness in the fingers and toes

Ans: A, B

**Feedback:**

Carbon dioxide readily crosses the blood–brain barrier, exerting its effects by changing the pH of brain fluids. Elevated levels of CO<sub>2</sub> produce vasodilation of cerebral blood vessels, causing headache, blurred vision, irritability, muscle twitching, and psychological disturbances. Distracters C and D are related to hypocalcaemia. Numbness in the fingers and toes correlates with respiratory alkalosis.

19. A 55-year-old woman has presented to the emergency department following a panic attack. Her blood pressure, respiratory rate, and heart rate are all highly elevated, while her temperature and oxygen saturation are within normal ranges. What is the woman's body most likely doing to address the changes in pH associated with her situation?
- A) Her kidneys will limit the amount of bicarbonate that they reabsorb.
  - B) She will be retaining  $\text{Cl}^-$  ions in an effort to lower pH.
  - C) Her respiratory center will attempt to lower her  $\text{CO}_2$  levels.
  - D) The patient's kidneys will excrete more hydrogen ions than they normally do.

Ans: A

**Feedback:**

Renal compensation for respiratory alkalosis involves decreased bicarbonate reabsorption. Manipulation of  $\text{Cl}^-$  ions is not a compensatory mechanism that the body is capable of, and increased  $\text{CO}_2$  levels and decreased  $\text{H}^+$  would compensate for her acid-base imbalance.

20. In the neurotrauma unit, a teenager with a closed head injury related to an automobile accident is experiencing high intracranial pressure (ICP). He is intubated and is on a ventilator. One treatment for this is to allow him to progress into which acid-base imbalance in an attempt to lower ICP?
- A) Metabolic acidosis
  - B) Metabolic alkalosis
  - C) Respiratory acidosis
  - D) Respiratory alkalosis

Ans: D

**Feedback:**

Respiratory alkalosis is seen as a treatment with the ventilator with intubated people experiencing high intracranial pressure (ICP) in order to attempt to lower the ICP.

## Chapter 9- Inflammation, Tissue Repair, and Wound Healing

1. A 23-year-old man has received a recent diagnosis of appendicitis following 24 hours of acute abdominal pain. The nurse providing care for the man is explaining that while unpleasant, the inflammation of his appendix is playing a role in his body's fight against the underlying infectious process. Which of the following teaching points should the nurse eliminate from his teaching to the patient?
- A) "Inflammation can help to remove the body tissue cells that have been damaged by infection."
  - B) "Inflammation will start your body on the path to growing new, healthy tissue at the site of infection."
  - C) "Inflammation helps your body to produce the right antibodies to fight the infection."
  - D) "Inflammation ultimately aids in eliminating the initial cause of the cell injury in your appendix."

Ans: C

**Feedback:**

Antibody production is not a noted component of the inflammatory response. Removing damaged cells, generating new tissue, and eliminating the cause of cell injury are all documented components of the inflammatory response.

2. A patient presented to the emergency department of the hospital with a swollen, reddened, painful leg wound and has been diagnosed with methicillin-resistant *Staphylococcus aureus* (MRSA) cellulitis. The patient's physician has ordered a complete blood count and white cell differential. Which of the following blood components would the physician most likely anticipate to be elevated?
- A) Basophils
  - B) Eosinophils
  - C) Platelets
  - D) Neutrophils

Ans: D

**Feedback:**

Increased neutrophils are associated with inflammation in general and bacterial infections in particular. Platelets play a role in inflammation, but their levels would not rise to the same extent as would neutrophils'. Eosinophils are not strongly associated with bacterial infection, and basophils would not increase to the same degree as neutrophils.

3. A 16-year-old girl has broken her arm while snowboarding. When she arrives at hospital, she is shocked at the amount of swelling at the injury site. Which of the following statements best explains the physiological rationale for her swelling?
- A) Migration and proliferation of mast cells, neutrophils, and platelets to the injury site occupy an increased volume of tissue.
  - B) Potent vasodilation increases the total volume of vascular space at the site of inflammation.
  - C) Osmotic flow of plasma into the intravascular space causes increased blood volume and interstitial fluid.
  - D) Loss of plasma proteins causes an increase in interstitial osmotic pressure.

Ans: D

**Feedback:**

Swelling is the result of plasma proteins leaving the interstitial space, resulting in increased osmotic pressure of interstitial fluid and movement of fluid into tissues. Blood components, vasodilation, nor increased intravascular volume accounts for swelling.

4. Which of the following phenomena best accounts for the increased presence of leukocytes at the site of inflammation?
- A) Existing leukocytes stick to the epithelial cells and move along blood vessel walls.
  - B) Increased numbers of leukocytes are released into circulation via cytokine stimulation.
  - C) Leukocytes are osmotically drawn from circulation into the interstitial space as a result of swelling.
  - D) Epithelium expresses leukocyte stimulation factors in response to cell injury.

Ans: A

**Feedback:**

During inflammation, leukocytes accumulate at the point of epithelial contact in the processes of margination, adhesion, and transmigration. This is not directly achieved by a way of increased leukocyte production or release, nor by osmotic pressure. The epithelium does not produce leukocyte stimulation factors.

5. When explaining the final stages of the inflammatory response to pathogens, the nurse will educate the patient about
- A) how the body can kill the pathogen by generating toxic oxygen and nitrogen products producing such things as nitric oxide and hydrogen peroxide.
  - B) margination, which is a process whereby white cells (leukocytes) stick to the endothelium and accumulate along the blood vessel.
  - C) the increase in vascular permeability, which lets fluids leak into the extravascular tissues.
  - D) the promotion of tissue regeneration whereby monocytes and macrophages produce potent prostaglandins and leukotrienes.

Ans: A

**Feedback:**

The latter stages of phagocytosis results in intracellular killing of pathogens accomplished by several mechanisms, including toxic oxygen and nitrogen products, lysozymes, proteases, and defensins. The metabolic burst pathways generate toxic oxygen and nitrogen products (*i.e.*, nitric oxide, hydrogen peroxide, and hypochlorous acid). Margination is one of the early stages of the inflammatory response. Vascular changes occur with inflammation but are prior to the final stage. Macrophages arrive within hours at the inflammation site.

6. A deficiency in which of the following would result in an inhibition of the inflammatory response?
- A) Histamine
  - B) Helper T cells
  - C) B cells
  - D) Vitamin K

Ans: A

**Feedback:**

Histamine is a key mediator in the inflammatory system, unlike helper T cells, B cells, or vitamin K.



7. When educating a patient with a wound that is not healing, the nurse should stress which of the following dietary modifications to ward off some of the negative manifestations that can occur with inflammation?
- A) Increase the amount of calcium in the diet, especially drinking milk and eating cheese.
  - B) This is the one time whereby you should eat more fat (both polyunsaturated and saturated), so you can absorb more fat soluble vitamins.
  - C) Since there is a loss of plasma proteins, you should increase your intake of organ meats like liver.
  - D) Increase your intake of oily fish and fish oil so that you will increase absorption of omega-3 polyunsaturated fatty acids.

Ans: D

**Feedback:**

Dietary modification of the inflammatory response through the use of omega-3 polyunsaturated fatty acids, specifically eicosapentaenoic acid and docosahexaenoic acid, which are present in oily fish and fish oil, may be effective in preventing some negative manifestations of inflammation.

8. Tumor necrosis factor- $\alpha$  and IL-1 are major cytokines that mediate inflammation. If the patient is developing a systemic response to an infection, the nurse will likely assess which of the following clinical manifestations? Select all that apply.
- A) Elevated temperature
  - B) Hypertension
  - C) Tachycardia
  - D) Decrease in urine output
  - E) Anorexia

Ans: A, C, E

**Feedback:**

IL-1 and TNF- $\alpha$  are mediators of the acute-phase responses associated with infection or injury. Features of these systemic responses include fever (elevated temperature), hypotension, tachycardia (increased heart rate), anorexia, increase in neutrophil count, and increased levels of corticosteroid hormones.

9. A 63-year-old woman has begun a diet that purports to minimize the quantity and effects of free radicals in her body. What physiological processes could best underlie her care provider's teaching about her new diet?
- A) Free radicals act as direct mediators in the inflammatory process.
  - B) Free radicals inhibit the inflammatory response, limiting preadaptive response to infection.
  - C) Free radicals increase cytokine expression and adhesion molecule levels, resulting in increased inflammation.
  - D) Free radicals contribute to atherosclerosis and decreased immune response.

Ans: C

**Feedback:**

Free radicals are thought to bring about an inappropriate inflammatory response by increasing cytokines and numbers of adhesion molecule. They are not direct mediators of inflammation and are not associated with decreased immune response but rather inappropriate inflammation. Free radicals are not associated with inhibition of the inflammatory response.

10. A nurse is changing the wound dressing on the coccyx-region pressure ulcer of an immobilized patient. The existing dressing is saturated with both watery, clear discharge and foul, gray-colored liquid. Which of the following entries in the patient's chart best captures this?
- A) "Large amounts of suppurative and serous exudates noted"
  - B) "Purulent discharge and fibrinous exudates noted on existing dressing"
  - C) "Abscess activity noted to coccyx wound"
  - D) "Plasma proteins and membranous exudates present on existing dressing"

Ans: A

**Feedback:**

Serous discharge is clear and low in plasma proteins, while suppurative, or purulent, exudates are a mass of degraded cells. An abscess would be physically contained with no discharge, and the exudate is neither fibrinous nor membranous.

11. Which of the following aspects of a patient's site of inflammation would help the care provider rule out chronic inflammation?
- A) High levels of macrophages
  - B) Increased neutrophils
  - C) Proliferation of fibroblasts
  - D) Infiltration of lymphocytes

Ans: B

**Feedback:**

Chronic inflammation lacks the sudden and marked proliferation of neutrophils that is associated with acute inflammation. Chronic inflammation is associated with increased presence and action of fibroblasts, macrophages, and lymphocytes.

12. In the ICU, a patient has been diagnosed with sepsis due to a bacterial invasion. The human body usually responds to infections by developing an uncontrolled inflammatory response with large production and release of inflammatory cytokines such as IL-1 and TNF- $\alpha$ . The nurse will note which of the following clinical manifestations in this septic patient as a result of the activation of these cytokines? Select all that apply.
- A) Excessive interstitial edema related to increased vascular permeability
  - B) Decreased cardiac output resulting from myocardial depression
  - C) Increased respiratory rate with crackles heard throughout all lung fields
  - D) Excessive bleeding from bowels and bladder
  - E) Lower blood pressure due to intravascular fluid loss

Ans: A, B, E

**Feedback:**

SIRS (systemic inflammatory response syndrome) can develop as a result of large quantities of microbes entering the blood, resulting in the release of enormous quantities of inflammatory cytokines. They cause generalized vasodilation (hypotension), increased vascular permeability (fluid loss into the tissues), intravascular fluid loss (dehydration with low urine output and low BP), myocardial depression (decreased cardiac output), and circulatory shock.

13. A 24-year-old woman presents with fever and painful, swollen cervical lymph nodes. Her blood work indicates neutrophilia with a shift to the left. She most likely has
- A) a mild parasitic infection.
  - B) a severe bacterial infection.
  - C) a mild viral infection.
  - D) a severe fungal infection.

Ans: B

**Feedback:**

Fever and painful, palpable lymph nodes are nonspecific inflammatory conditions; leukocytosis is also common but is a particular hallmark of bacterial infection. Neutrophilia also indicates a bacterial infection, whereas increased levels of other leukocytes would indicate other etiologies. The shift to the left—the presence of many immature neutrophils—indicates that the infection is severe, because the demand for neutrophils exceeds the supply of mature cells.

14. Which of the following patients would have a very poor response related to tissue regeneration of his or her injured area?
- A) A 21-day-old infant undergoing a diaphragmatic hernia repair
  - B) A 54-year-old male who had a massive MI 4 days ago and came to the ED today for treatment
  - C) A 73-year-old female who is undergoing lithotripsy for kidney stones
  - D) A 33-year-old athlete undergoing surgery to repair a torn MCL in his right knee

Ans: B

**Feedback:**

Permanent or fixed cells cannot undergo mitotic division. The fixed cells include nerve cells, skeletal muscle cells, and cardiac muscle cells.

15. A hospital patient has a large, superficial wound on her elbow that was the result of shearing action when she was moved up in her bed. The patient's husband mentions that the wound looks infected and irritated because the wound bed is completely red. Which of the following responses would be inappropriate?
- A) "Even though it is red, it doesn't mean that the wound is infected."
  - B) "The red areas show that there is enough circulation to facilitate healing."
  - C) "Those are fresh blood vessels that are a sign of healthy healing."
  - D) "A thin sheet of blood clotting is actually desirable and not a sign that your wife's wound is infected."

Ans: D

**Feedback:**

Granulation tissue indicates sufficient circulation and angiogenesis associated with healthy wound healing. Granulation tissue consists of new blood vessels, not clotted cellular components.

16. Which of the following processes would most likely be considered an anomaly during the cellular phase of inflammation?
- A) Platelet aggregation
  - B) Vasoconstriction
  - C) Migration of phagocytic white cells
  - D) Macrophage activity

Ans: B

**Feedback:**

While vasoconstriction is a component of the immediate inflammatory response, the later cellular phase of inflammation is accompanied by vasodilation. Platelet aggregation, vasoconstriction, migration of phagocytic white cells, and macrophage activity are all associated with the cellular phase.

17. A patient who is recovering from burn injuries is discussing his prognosis with a physician. Which of the following teaching points about expectations for healing should the physician include?
- A) "Once your healing is complete, your skin will be just as strong as before your accident."
  - B) "You may find that the scar is a bit smaller than the area of the wound."
  - C) "You'll find that your new tissue is more elastic and fragile than the rest of your skin."
  - D) "The final remodeling phase of healing may last up to 3 months in your case."

Ans: B

**Feedback:**

Scars are often smaller than the original area of the wound. There is nearly always an accompanying loss of strength and elasticity, and remodeling can take over 6 months.

18. Of the following list of patients, who would likely benefit the most from hyperbaric oxygen therapy?
- A) A trauma patient who developed *Clostridium* spp., an anaerobic bacterial infection in his femur
  - B) A patient who developed a fistula between her bowel and vagina following cervical cancer surgery
  - C) A school-aged child who fell on gravel and has terrible road rash
  - D) A football player who has torn a meniscus in his knee for the third time this year

Ans: A

**Feedback:**

Hyperbaric oxygen is a treatment that has demonstrated improved wound healing in multiple types of injuries. It enhances wound healing by a number of mechanisms, including the increased killing of bacteria by neutrophils, impaired growth of anaerobic bacteria, and the promotion of angiogenesis.

19. Which of the following patients is most likely to have impairments to the wound-healing process? A patient with
- A) chronic obstructive pulmonary disease.
  - B) a diagnosis of multiple sclerosis and consequent impaired mobility.
  - C) poorly controlled blood sugars with small blood vessel disease.
  - D) congenital heart defects and anemia.

Ans: C

**Feedback:**

Diabetes mellitus is strongly associated with impaired wound healing. The other noted pathologies are less causative of deficiencies in the healing process.

20. A 79-year-old female resident of an assisted living facility receives care from a community nurse on a regular basis for treatment of a chronic venous leg ulcer. Which of the following factors would the nurse be most justified in ruling out as a contributing factor to the client's impaired wound healing?

- A) A lower skin collagen content than in younger adults
- B) Decreased fibroblast synthesis
- C) Slow reepithelialization
- D) Decreased antibody levels

Ans: D

**Feedback:**

Older adults do not normally have diminished antibody levels. Low collagen levels, decreased fibroblast activity, and slow reepithelialization are common impediments to wound healing in the elderly.

## Chapter 10- Alterations in Temperature Regulation

1. The medical team is assessing a newly admitted patient who is hypothermic following a night spent lost on a ski slope. The health care professionals would recognize that which of the following phenomena most likely contributed to minimizing the client's heat loss in a cold environment?
  - A) The high heat conductivity of subcutaneous tissue protected against core heat loss.
  - B) Increased blood flow to the outer shell prevented superficial freezing and loss of heat.
  - C) The tissue thickness of the outer shell increased and preserved heat.
  - D) Shell temperature dropped, minimizing the temperature variance between the core temperature and environmental temperature.

Ans: C

**Feedback:**

The thickness of the outer shell is modifiable in response to the environmental temperature and can be increased through decreased blood flow. Subcutaneous tissue provides protection due to its low, not high, conductivity. Blood flow decreases to the outer shell in low temperatures, and the lowering of the shell temperature does not necessarily minimize heat loss.

2. In the ICU setting, a patient transported from surgery following open heart bypass grafting will likely have his core temperature measured by a/an
  - A) rectal tube inserted to prevent evacuation from bowels while recovering from anesthesia.
  - B) temperature probe taped behind his ear.
  - C) esophageal flexible thermometer monitoring aorta distention.
  - D) pulmonary artery catheter being used to measure cardiac output.

Ans: D

**Feedback:**

Core temperature may be obtained by a rectal tube, by using an esophageal flexible thermometer, from a pulmonary artery catheter used for thermodilution measurement of cardiac output, or from a urinary catheter with a thermosensor that measures the temperature of urine in the bladder. Since CABG patients have their core temperature decreased to the 80s, the pulmonary artery catheter is the best choice for measuring core temperature while they are still under the influence of anesthesia.

3. A nurse is providing care for several clients on a neurological unit of a hospital. In which of the following clients would the nurse be justified in predicting a problem with thermoregulation?
- A) A 66-year-old male with damage to his thalamus secondary to a cerebral vascular accident
  - B) A 22-year-old male with damage to his cerebellum secondary to a motorcycle accident
  - C) A 68-year-old male with end-stage neurosyphilis
  - D) A 45-year-old female with a T8 fracture secondary to a diving accident

Ans: A

**Feedback:**

The thalamus is involved in the sensation and regulation of body temperature. Syphilis, a T8 fracture, and damage to the cerebellum would unlikely manifest by difficulties with thermoregulation.

4. An 8-year-old boy has fallen through the ice while skating on a frozen pond. By the time paramedics arrive, the boy has been removed from the water by his friends, but his core body temperature is 31.1°C (88.0°F). The responders would recognize that which of the following physiological processes would have been active during the boy's accident?
- A) Production and release of cortisol as a heat generation process
  - B) Stimulation of the thyroid gland in order to increase cellular activity
  - C) Heat production through increased body metabolism
  - D) Energy generation through the release of epinephrine and norepinephrine

Ans: C

**Feedback:**

An immediate response to low temperature is a heat-generating increase in metabolism. Cortisol is not involved in heat generation, and the thyroid is only capable of a longer-term effect on metabolic activity. Epinephrine and norepinephrine shift activity away from energy production and toward heat production.



5. An agricultural worker is picking fruit on a day when the air temperature is 106°F. Which of the following processes will most likely be occurring while he works?
- A) Conduction of heat from the air will be heating his skin surface and raising his core temperature.
  - B) Blood volume at his skin surface will be increasing to dissipate heat.
  - C) His autonomic nervous system will be stimulating him to sweat.
  - D) Radiation from his skin surfaces will be dissipating heat into the environment.

Ans: B

**Feedback:**

In response to high temperatures, blood volume at the surface increases in order to dissipate heat. Heat exchange between his body and the air is radiation, not conduction, and the sympathetic, not autonomic, nervous system will be in control of the sweating process. Because the air temperature exceeds his body temperature, he will not be able to lose heat in this way.

6. A health educator is teaching a group of colleagues about the physiology of thermoregulation. Which of the following statements is most accurate?
- A) "Endogenous pyrogens induce host cells to produce exogenous pyrogens."
  - B) "Prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) exerts a direct fever-producing effect on the hypothalamus."
  - C) "PGE<sub>2</sub> induces Kupffer cells to initiate a fever response via hepatic sinusoids."
  - D) "Arachidonic acid induces cytokines to act on the temperature regulation center."

Ans: B

**Feedback:**

PGE<sub>2</sub> is the protein that exerts control on the hypothalamus and induces fever. Exogenous pyrogens induce host cells to produce endogenous pyrogens, and Kupffer cells produce PGE<sub>2</sub>. Cytokines do not act directly in the hypothalamus.

7. A physician is noting the recent vital signs for several patients on an acute medical ward of a hospital. Which of the following hospital patients with noninfectious diagnoses would most likely have a fever?
- A) A 71-year-old female with limited mobility, chronic obstructive pulmonary disease, and vascular dementia
  - B) A 33-year-old female with a postoperative deep vein thrombosis and pulmonary embolism
  - C) A 51-year-old obese male with hepatic encephalopathy secondary to alcohol abuse
  - D) A 71-year-old male with congestive heart failure and peripheral edema

Ans: B

**Feedback:**

Pulmonary emboli can produce a fever. The other diagnoses do not.

8. A 54-year-old man presents with a temperature of 38.8°C (101.8°F), a racing heart, fatigue, and an upset stomach after spending an afternoon building a deck on a very hot, humid day. The physician assessing the man is performing a differential diagnosis as part of her assessment. Which of the following findings would suggest fever rather than hyperthermia as a cause of the elevation in the man's temperature?

A) Moist skin  
B) Dizziness  
C) Shivering  
D) Cognitive changes

Ans: C

**Feedback:**

Shivering is a response to a signal for increased heat production. It would only occur on a hot day if the set point for temperature regulation were increased, as in the case of fever but not hyperthermia. Moist skin, cognitive changes, and dizziness can occur with either fever or hyperthermia.

9. A nurse is providing care for a 44-year-old male client who is admitted with a diagnosis of fever of unknown origin (FUO). Which of the following characteristics of the client's history is most likely to have a bearing on his current diagnosis?

A) The client is cachexic and an African American.  
B) The client is HIV positive and homeless.  
C) The client is malnourished, hypomagnesemic, and hypocalcemic.  
D) The client is receiving intravenous normal saline with 20 mEq KCl.

Ans: B

**Feedback:**

FUO is associated with HIV. The other aspects of the client's circumstances are not noted to correlate with FUO.

10. In the hospital setting, one of the best ways to lower a hyperthermic patient's fever would be to facilitate conduction of heat from the body by

A) providing frequent sponge baths with cool water.  
B) taking all covers/clothing off and pouring alcohol on the skin.  
C) placing him or her on a cooling mattress that circulates a coolant solution through the mattress.  
D) placing IV solutions into the freezer for 30 minutes prior to hanging them.

Ans: C

**Feedback:**

Cooling mattress facilitates the conduction of heat from the body into the coolant solution that circulates through the mattress. Care must be taken so that the cooling method does not produce vasoconstriction and shivering. Sponge baths and alcohol solutions increase evaporative heat loss but may cool them too quickly. IV solutions should not be placed in a freezer.

11. A child aged 33 days is presented to the emergency department of a hospital by her parents following a 2-day fever. Her temperature is 38°C (100.4°F) tympanically. Which of the following diagnostic tests is most clearly indicated?

- A) Electrolytes, blood urea nitrogen (BUN), and creatinine levels
- B) Abdominal ultrasound
- C) Computed tomography (CT) of the head
- D) Urine for culture and sensitivity

Ans: D

**Feedback:**

Infants with a fever are at risk of urinary tract infections, which would be diagnosed through a urine test for culture and sensitivity. Electrolytes, BUN and creatinine, CT head, and abdominal ultrasound are not as closely associated with differential diagnosis of the child's fever.

12. An 88-year-old resident of a long-term care home has been suffering from a 3-day onset of increased shortness of breath and decreased oxygen saturation. At the hospital, an anterior-posterior chest x-ray and sputum culture and sensitivity have confirmed a diagnosis of bacterial pneumonia, yet the client's tympanic temperature has not exceeded 37.3°C (99.2°F). The health care team would recognize that which of the following phenomena likely underlies this situation?

- A) An older adult is often insensitive to exogenous pyrogens.
- B) An older adult is sometimes incapable of vasodilation.
- C) An older adult's hypothalamus has diminished thermoregulatory ability.
- D) Infections manifest by cognitive changes in older adults.

Ans: C

**Feedback:**

The hypothalamus in older adults is often less capable of thermoregulation than in younger clients. There are sometimes alterations in the release of endogenous pyrogens and deficits in vasoconstriction. While infections do often manifest with cognitive changes in older adults, this does not explain why fever is precluded.

13. A 14-year-old boy is participating in his school's track meet; the outdoor temperature is 99°F, and a teacher has found the boy sitting restless in the shade and disoriented to time. The teacher notes that the student has dry skin in spite of the high temperature and the fact that he has recently completed a running event. The teacher calls for the school nurse, who will recognize which of the following potential diagnoses and anticipated hospital treatments?
- A) Heat exhaustion, likely treated with rest, shelter from the sun, and salt tablets
  - B) Heat stroke, likely treated with submersion in cold water
  - C) Heat stroke, likely treated with rehydration by intravenous hypotonic solution
  - D) Heat exhaustion, likely treated with oral rehydration with cool water

Ans: B

**Feedback:**

Cognitive changes and lack of sweating are signs of heat stroke as opposed to heat exhaustion. A common treatment for heat stroke is immersion in cold water to rapidly decrease the core and shell temperature. Salt tablets, hypotonic IV rehydration, and oral water rehydration would not be appropriate treatments.

14. About 30 minutes following the morning medication pass, the nurse's aide informs the nurse that one of the patients on their team is complaining of "hot sweats." The aide also states that his temperature is now 101.5°F. Knowing that some medications can cause hyperthermia, the nurse reviews his medications. From the following patient list, which patient is at high risk for developing an elevated temperature?
- A) Patient with hypertension being treated with Prinivil (Lisinopril).
  - B) Suicidal patient who overdosed on his monoamine oxidase (MOA) inhibitor.
  - C) Postoperative patient receiving Oxycodone (OxyContin) for his pain.
  - D) Patient with *C. difficile* receiving Vancocin (Vancomycin) IV every 6 hours.

Ans: B

**Feedback:**

Overdoses of serotonin reuptake inhibitors or use in people taking MOA inhibitors can cause agitation, hyperactivity, and hyperthermia.

15. A 20-year-old female has been brought to the emergency department from a rave party where she collapsed on the dance floor. Her accompanying friends acknowledge that the woman took ecstasy early in the evening. Her heart rate is regular at 89 beats/minute and temperature 39.8°C (103.6°F) orally. The emergency team would recognize that which of the following phenomena, related to the drug, is a likely contributor to the woman's status?

A) Increased peripheral vasoconstriction  
B) The direct pyrogenic effect of ecstasy  
C) The initiation of an inappropriate immune response  
D) Impaired temperature regulation by the hypothalamus

Ans: A

**Feedback:**

Amphetamines such as ecstasy can induce hyperthermia by increasing peripheral vasoconstriction. They are not associated with direct hypothalamic effect, pyrogenic effect, or an immune response.

16. During surgery, the anesthesia personnel noticed the patient is having a steady rise in his end-tidal carbon dioxide level. At this time, the nurse anesthetist begins to assess the patient for malignant hyperthermia. The initial (priority) assessment for this disorder may include

A) hypotension.  
B) acute renal failure.  
C) skeletal muscle rigidity.  
D) sudden cardiac arrest.

Ans: C

**Feedback:**

In addition to a steady rise in end-tidal carbon dioxide levels, an initial sign of the disorder, when the condition occurs during anesthesia, is skeletal muscle rigidity.

17. In the ED, a homeless patient is brought in with severe hypothermia. The police officers also state that they found a "bottle of booze" on the sidewalk next to him. This puts the nurse on high alert since alcohol contributes to hypothermia by

A) interfering with the appetite center in the brain causing the person to not respond to hunger pains.  
B) causing the person to have less fat on his body.  
C) dulling the mental awareness that impairs judgment to seek shelter.  
D) increasing his basal metabolic rate, so he will run out of ATP faster than expected.

Ans: C

**Feedback:**

Alcohol and sedative drugs dull mental awareness to cold and impair judgment to seek shelter or put on additional clothing. Alcohol also inhibits shivering. It does not interfere with the appetite center. Malnutrition causes the person to have less fat. Alcohol may initially increase pulse, but as the hypothermia continues, the pulse rate will lower.

18. An 80-year-old woman is undergoing total hip replacement surgery as treatment for severe osteoarthritis. During the procedure, the patient's core temperature falls to 31.6°C (88.9°F), necessitating interventions to address her hypothermia. The surgical team recognizes that there are likely multiple causes of patient's hypothermia. Which of the following factors would the team be most justified in ruling out as a contributor?
- A) The cold environment in most operating theaters
  - B) Decreased vasoconstriction as a result of anesthetic
  - C) Decreased temperature adaptation due to her unconscious state
  - D) Impaired thermoregulatory mechanisms due to anesthetic

Ans: C

**Feedback:**

Unconsciousness in and of itself is not an identified contributor to surgical hypothermia. The cold environment, decreased vasoconstriction, and impaired thermoregulation resulting from an anesthetic are all potential contributors.

19. A 38-year-old male client with mild hypothermia following a prolonged hike in the rain is brought to hospital by ambulance. Which of the following sets of vital signs would be the most characteristic of the client's diagnosis?
- A) BP 178/102; RR 12; HR 58
  - B) BP 109/68; RR 9; HR 130
  - C) BP 160/99; RR 30; HR 66
  - D) BP 138/84; RR 28; HR 111

Ans: D

**Feedback:**

Mild hypothermia is associated with accelerated HR, slightly increased BP, and hyperventilation; these parameters are best characterized by the vital signs referred in answer D.

20. Following a cardiothoracic surgery, where controlled therapeutic hypothermia was utilized to decrease metabolic demands, the nurse responsible for recovering this patient should be assessing for which of the following potential complications to cold cardioplegia?

- A) Development of a first-degree AV block
- B) Vasoconstriction resulting in weak pedal pulses, requiring the use of a Doppler
- C) Frequent premature ventricular contractions (PVCs) on the telemetry monitor
- D) Cyanosis in lower extremities with no blanching in the toes

Ans: C

**Feedback:**

Potential complications to cold cardioplegia include such signs and symptoms as ventricular dysrhythmias, decreased cerebral blood flow, and postoperative myocardial depression. First-degree AV block is common in patients with heart problems. Vasoconstriction of vessels is an expected effect of cold cardioplegia along with cold, bluish lower extremities.

## Chapter 10- Mechanisms of Infectious Disease

1. *Staphylococcus aureus* commonly found in the skin, nares, and other body sites of patients without any signs and symptoms of infection is known as which of the following conditions listed below?

A) An opportunistic infection  
B) A parasitic infestation  
C) Bacterial colonization  
D) A saprophytic infection

Ans: C

**Feedback:**

The ongoing presence of bacteria in the body that do not cause infection is called colonization. Opportunistic infection by ordinarily nonpathogenic organisms can occur in immunosuppressed hosts. Parasitism is a condition in which the organism exists at the expense of, and without benefiting, the host. Saprophytes do not cause infection.

2. Which of the following statements is an accurate descriptor of the role of viruses in human infections?

A) Viruses have no genetic material of their own.  
B) Some viruses are capable of transforming normal host cells into malignant cells.  
C) Viruses are often implicated in cases of transmissible neurodegenerative diseases.  
D) Viruses require stimulation after a latent period before they are able to produce symptoms.

Ans: B

**Feedback:**

Viruses that are categorized as oncogenic are able to induce malignancy in host cells. Viruses have limited genetic material (either RNA or DNA), but no virus lacks genetic material. Transmissible neurodegenerative disease is associated with prions. Not all viruses include a latent period.

3. Which of the following types of pneumonia listed below is best characterized by an infective agent that produces sputum samples with a peptidoglycan cell wall, expresses endotoxins, replicates readily in broth and on agar, grows in clusters, has pili, and does not stain when exposed to crystal violet?

A) Chlamydial  
B) Viral  
C) Mycoplasmal  
D) Bacterial

Ans: D

**Feedback:**

Although chlamydiae, viruses, and mycoplasmas all can cause pneumonia, only bacteria have all of these characteristics. Chlamydiae and viruses are obligate intracellular organisms and therefore would grow only in cell culture, and mycoplasmas lack the peptidoglycan cell wall typical of bacteria.



4. The nurse will most likely assess which of the following clinical manifestations in a client who was diagnosed with Creutzfeldt-Jakob disease?

- A) Change in behavior and memory and loss of coordination leading to encephalopathy
- B) Gastrointestinal problems like vomiting and diarrhea
- C) Muscle inflammation and edema, making movements very painful
- D) Projectile vomiting, hypertension, and drowsiness caused by elevated ICP

Ans: A

**Feedback:**

Creutzfeldt-Jakob disease is collectively called transmissible neurodegenerative disease that is characterized by a slowly progressive, noninflammatory neuronal degeneration and leads to a loss of coordination, dementia, and death. With this disease, encephalopathy is the primary presenting factor. GI problems, muscle inflammation, and ICP are not clinical manifestations associated with this prion.

5. The spirochete leptospire is primarily transmitted to farmers by

- A) an airborne mechanism.
- B) exposure to spores in the environment.
- C) direct contact with infected animals.
- D) a mosquito bite.

Ans: C

**Feedback:**

The pathogenic leptospire infect a wide variety of wild and domestic animals. Infected animals shed the organisms into the environment through the urinary tract. Transmission to humans occurs by contact with infected animals or urine-contaminated surroundings. This spirochete is not transmitted by air, spores, or a fomite.

6. The nurse knows which of the following statements best describes the characteristic trait of rickettsiae related to Rocky Mountain spotted fever? Rickettsiae

- A) are eukaryotic.
- B) have both RNA and DNA.
- C) have a distinct spiral-shaped morphology.
- D) are neither gram negative nor gram positive.

Ans: B

**Feedback:**

Rickettsiae combine characteristics of bacteria and viruses. Rickettsiae are prokaryotic but not spiral shaped. Rickettsiae are able to be classified by Gram stain like other microorganisms.

7. An 81-year-old female patient in a subacute medical unit of a hospital has developed an oral *Candida albicans* infection. Which of the following phenomena would the patient's nurse suspect as a key contributing factor to her infection?
- A) The moist and temperature-suited oral environment of the client's mouth
  - B) The ability of fungi to remain latent until the host reaches an immunocompromised state
  - C) Antibiotic therapy that eliminated normal bacterial flora
  - D) The airborne communicability of yeast and molds and subsequent inhalation

Ans: C

**Feedback:**

Elimination of bacterial flora that normally keeps colonizing fungi in check can induce the proliferation of fungi. The environment of the client's mouth provides a conducive environment but with an intact immune system is rarely a direct contributor to colonization. Latency is not a common trait of *Candida albicans*, and airborne transmission is not likely to be a causative factor.

8. The nurse knows which of the following statements below is appropriate to be included in an education session for a 21-year-old male with a diagnosis of malaria?
- A) "Your infection likely began with the introduction of fertilized protozoal ova from a mosquito."
  - B) "The protozoa responsible have hijacked the genetic material of your cells in order to reproduce."
  - C) "You are very tired because the pathogens are utilizing the ATP that your own cells need."
  - D) "The infectious organisms are considered tiny, single-celled animals, given their complete eukaryotic machinery."

Ans: D

**Feedback:**

Protozoa possess full eukaryotic machinery including organelles and a nucleus. Ova are associated with helminthes, and protozoa do not utilize the host's genetic material for reproduction. Appropriation of ATP is associated with chlamydiae.

9. The physician knows the client G1P0 has correctly understood the prenatal education regarding sexually transmitted infection as evidenced by which of the following statements listed below?
- A) "Gonorrhea and chlamydia out of the various infectious agents pose the greatest risks of transmission from mother to child."
  - B) "I know that my baby will need observation for HIV signs and symptoms in the weeks following my delivery."
  - C) "My baby could become infected either across the placenta or during the birth itself."
  - D) "If I receive prophylactic immunization, I will reduce my baby's chance of being born with an illness."

Ans: C

**Feedback:**

Vertical transmission may occur across the placenta in utero or during the birth event itself. Cytomegalovirus and HIV infections are the most common congenital infections. HIV signs and symptoms are not immediately apparent in the infant. Prophylactic immunization is not noted as a proven intervention for preventing vertical transmission.

10. Which of the following procedures reduces the potential for infection primarily by addressing the portal of entry?
- A) Wiping down common areas with buffered bleach on a regular basis
  - B) Wearing gloves when contact with blood or body fluids is anticipated
  - C) Disposing of soiled clothing and bed linens in a dedicated receptacle
  - D) Isolating patients who have antibiotic-resistant infections

Ans: B

**Feedback:**

Wearing gloves specifically blocks the portal of entry to the health care worker through the use of a physical barrier. Bleaching and cleaning, as well as disposing of soiled linen, eliminate the source of infection by killing microorganisms, and isolating patients similarly addresses a source by minimizing contact with uninfected persons.

11. A school-age child with a history of asthma has brought a note home from school stating that there has been one case of meningitis (*Neisseria meningitides*) in the school. Since the mother is a nurse, she is very concerned since she knows the portal of entry of this pathogen is
- A) by inhalation via the respiratory tract such as through breathing or yawning.
  - B) by direct contact with a contaminated object such as a pencil.
  - C) by ingestion such as when children share their drink with their friends.
  - D) through a cut or abrasion that may occur on the playground.

Ans: A

**Feedback:**

*Neisseria meningitides* is one of a number of pathogens that invade the body through the respiratory tract.

12. Which of the following scenarios best describes an example of infection originating with a fomite?
- A) A client who contracted hepatitis C through sharing a contaminated syringe with an infected person
  - B) A nurse with a positive tuberculin screening test (PPD) after admitting a patient diagnosed with tuberculosis (TB)
  - C) A woman who contracted Lyme disease after a tick bite
  - D) A man who has been diagnosed with trichinosis after eating undercooked pork

Ans: A

**Feedback:**

An object that carries an infectious organism, such as a dirty syringe, is known as a fomite. Airborne contact with TB does not utilize a fomite. An infection via contact with an infected arthropod constitutes zoonosis. A person who consumes ova in undercooked meat acquires an infection by ingestion.

13. The nurse knows which of the following statements listed below best matches the phase of the infectious process of food poisoning with a client with sudden, violent diarrhea and vomiting after consuming chicken and potato salad 8 hours ago at the beach on a hot day?
- A) Maximum impact of infectious process
  - B) Insidious prodromal phase
  - C) Sudden incubation of active replication
  - D) Subacute prodromal phase

Ans: A

**Feedback:**

The lack of prodrome and intense symptom onset typify a fulminant illness. The onset described does not characterize a prodromal phase or incubation.

14. Which of the following infectious agents listed below would be a site-specific pathogen and not spread throughout the body via the circulatory system? A patient diagnosed with
- A) *B. burgdorferi* caused by a tick bite.
  - B) *Salmonella typhi* related to ingestion of contaminated food or water.
  - C) *Helicobacter pylori* diagnosed after an endoscopic procedure.
  - D) *N. meningitidis* infection in a child in a daycare setting.

Ans: C

**Feedback:**

*H. pylori* is an extreme example of a site-specific pathogen (localized infectious disease). The other three pathogens are called systemic pathogens because they can disseminate throughout the body via the circulatory system.

15. A family consumed some undercooked hamburger at a picnic and has since developed bloody diarrhea. The nurse knows which of the following statements listed below is correct regarding the infectious process?

- A) Evasive factors that become more virulent by evading parts of the host's immune system
- B) Exotoxins that damage vascular endothelium causing bleeding and low platelet counts
- C) Adhesion factors that can anchor a pathogen firmly to the host tissue surfaces
- D) Invasive factors capable of destroying the cell membrane by utilization of enzymes

Ans: B

**Feedback:**

Exotoxins can allow organisms to produce hemorrhagic colitis, which can be fatal. It is characterized by vascular endothelial damage, acute RF, and thrombocytopenia (low platelet counts). Toxic cell walls are classified as endotoxins. The ability to survive immune responses characterizes evasive factors. Adhesion factors and invasive factors are not involved in this situation.

16. A patient diagnosed with *H. pylori* asks the nurse, "How an infection can occur in the stomach since it is an acid environment?" The nurse responds,

- A) "We have many infectious agents that can live in an acidic environment with a pH more than 8.0."
- B) "*H. pylori* is a virus and is still being researched as to how it is able to survive in the stomach acids."
- C) "*H. pylori* produces an enzyme called urease that converts gastric juices into ammonia, which neutralizes the acidic stomach environment."
- D) "This parasite secretes an enzyme called coagulase, which protects the pathogen from the antibodies."

Ans: C

**Feedback:**

*H. pylori*, the infectious cause of gastritis and gastric ulcers, produces the urease enzyme on the outer cell wall. The urease converts gastric urea into ammonia, thus neutralizing the acidic environment of the stomach and allowing the organism to survive in this hostile environment.

17. A client has a suspected infection by a particular microorganism in question that cannot be cultured. Which of the following processes listed below is most likely to result in an accurate diagnosis for the client?
- A) Observe directly for the presence or absence of specific antigens in the client's blood serum sample.
  - B) Introduce cultured, marked antibodies to the client, and observe for a reaction with antigens in the client.
  - C) Observe for a cytopathic effect on biopsy tissue samples from the client's mucosa.
  - D) Release purified antigens into the client's circulation to observe whether the client has produced the relevant antibodies.

Ans: B

**Feedback:**

The process described is direct antigen detection, which can indirectly implicate a microorganism that is unable to be cultured. Answer D describes the same process in reverse, while answers A and C do not describe existing diagnostic processes.

18. A client has been diagnosed with herpes simplex virus. The client states that, "modern medicine produces more and more antivirals every year, and so the treatment should be simple." Which of the following statements listed below is the best response?
- A) "The recent rise of drug resistance has significantly hampered the elimination of viruses."
  - B) "The cell coat of viruses is particularly resilient to the available synthetic antivirals."
  - C) "The use of antivirals is severely limited by the unwanted adverse effects that they cause."
  - D) "Treatment options for viruses are often limited because what destroys viruses often damages your own body cells."

Ans: D

**Feedback:**

Viruses are difficult to treat because interference with their replication often requires interference with the body's cell replication processes. Although they do exist with antiviral treatments, drug resistance and side effects are phenomena more closely associated with antibacterials. Antivirals act upon DNA or RNA synthesis, not the cell wall.

19. A client with a diagnosis of sepsis has received intravenous immune globulin (IVIG) as a partial treatment. The nurse knows which of the following client responses listed below would best suggest an accurate understanding of IVIG treatment?
- A) "These antibodies in the solution have been collected from individuals who have successfully fought off the same infection."
  - B) "The IVIG should help stimulate fever, inflammation, and tissue repair in the fight against the infection."
  - C) "A big part of my IVIG treatment is actually stimulating and supplementing my immune system to do the work itself."
  - D) "The main effect of IVIG is to cause my body to produce more white blood cells to fight infection."

Ans: C

**Feedback:**

IVIG involves infusion of pooled antibodies that supplement and stimulate the client's immune system to respond above and beyond its own capacities. It is not collected from individuals who have had similar infections. The primary effect of IVIG is not white blood cell production. Stimulation of fever, inflammation, and tissue repair are more closely associated with cytokine therapy.

20. The nurse in the emergency department knows that clients exposed to *Clostridium botulinum*, an agent of bioterrorism, would likely be exhibiting which of the following clinical manifestations listed below?
- A) Blindness and respiratory distress
  - B) Hemorrhage from all orifices resulting in signs of shock and coma
  - C) Frothy, odiferous diarrhea and dehydration
  - D) Muscle weakness in extremities eventually leading to paralysis of respiratory muscles

Ans: D

**Feedback:**

*Clostridium botulinum* causes neuromuscular paralysis and is listed as a category A agent.

21. Health care team members know recently that an increased incidence of infections such as West Nile virus and SARS does not match with previously established patterns. Which of the following phenomena constitutes the most significant contributor to the spread of new diseases in the United States?

- A) Drug resistance by bacterial and protozoal infections
- B) Increased ease and frequency of individual and group international travel
- C) Genetic variation and mutation by microorganisms
- D) Decreased living standards and public health standards in urban areas

Ans: B

**Feedback:**

While drug resistance, lapses in public health, and genetic variation are all contributing factors in incidents of infection, the increase in new and global diseases is primarily attributed to the ease and frequency of individual and group international travel.



## Chapter 11- Innate and Adaptive Immunity

1. The nurse knows which of the following statements listed below relative to a client with malignant melanoma treated with alpha interferon (IFN-a) is accurate? Alpha interferon (IFN-a)
- A) will kill certain microorganisms that may help spread the cancer.
  - B) plays an important role in the modulation of the inflammatory response.
  - C) helps keep all the blood levels at a higher level.
  - D) controls the migration of leukocytes to their primary site.

Ans: B

**Feedback:**

IFNs are cytokines that primarily protect the host against viral infections and play a role in the modulation of the inflammatory response.

2. The nurse knows which of the following statements listed below is accurate regarding the functions and nature of cytokines relative to a variety of pathologies?
- A) "A particular cytokine can have varied effects on different systems, a fact that limits their therapeutic use."
  - B) "Cytokine production is constant over time, but effects are noted when serum levels cross a particular threshold."
  - C) "Most cytokines are produced by granular leukocytes, and different cells are capable of producing the same cytokine."
  - D) "Cytokine actions are self-limiting, in that activation of one precludes activation of other cytokines with similar actions."

Ans: A

**Feedback:**

Because cytokines can mediate diverse effects due to their pleiotropic properties, they can have significant side effects. Cytokine production is brief, not constant, and production does not normally take place in granulocytes. Activation of a cytokine does not necessarily limit other similar cytokines, and additive effects are not uncommon.

3. The nurse knows that a drug in a category identified as a colony-stimulating factor (CSF) helps
- A) cells engulf and digest microbes that want to attach to cell membranes and destroy normal cell function.
  - B) produce cells that will be the first responder cells to protect against cancer formation.
  - C) stimulate the person's immune system so that he or she can kill his or her own cancer cells.
  - D) stimulate bone marrow to produce large numbers of mature cells such as platelets and erythrocytes.

Ans: D

**Feedback:**

CSFs participate in hematopoiesis by stimulating bone marrow pluripotent stem and progenitor or precursor cells to produce large numbers of mature platelets, erythrocytes, lymphocytes, neutrophils, and monocytes.

4. Which of the following individual situations listed below best exemplifies the processes of innate immunity?
- A) A child who has experienced heat and swelling of his skinned knuckle
  - B) An adult who complains of itching and is sneezing because he is allergic to pollen
  - C) A client whose blood work indicates increased antibody titers during an acute illness
  - D) A client who has experienced rejection of a donor liver after transplantation

Ans: A

**Feedback:**

In a skinned knuckle, one of the body's main innate defenses, the skin, is breached. The heat and swelling that accompany a breach in the skin are inflammatory responses, part of the body's innate immune defenses. Allergies are an inappropriate adaptive response mediated by immunoglobulin E; antibody titers increase during illness in response to the infection; and transplanted organs are rejected because the organ is recognized as foreign. These are all aspects of specific, acquired immunity.

5. The nurse knows which of the following components listed below is needed for long-lasting immunity in a client with a diagnosis of sepsis without the causative agent identified?
- A) Neutrophils
  - B) Lymphocytes
  - C) Colony-stimulating factors
  - D) Natural killer cells

Ans: B

**Feedback:**

Lymphocytes provide lifelong immunity and an antigen-specific response to harmful microorganisms. Neutrophils, macrophages, and natural killer cells do not provide this.

6. A client has been identified as having an excess of macrophage inhibitory factor, causing the client to have inhibited movement and activity of macrophages. Which of the following processes listed below would the health care team member expect to remain unaffected?

- A) Amplification of the immune response
- B) Destruction of virus-infected or tumor cells
- C) Initiation of adaptive immunity
- D) Specificity and memory of the immune response

Ans: D

**Feedback:**

Specificity and memory are the defining characteristics of the adaptive immune system, and macrophages do not perform this particular role. Amplification of the immune response, destruction of virus-infected or tumor cells, and initiation of adaptive immunity are all components of macrophage activity.

7. A client who has a diagnosis of an autoimmune disease asks his nurse why it is that his immune system does not attack all of the cells that make up his body. Which of the following aspects of pathogen recognition in the innate immune system listed below would underlie the nurse's response?

- A) Normal host cells excrete inhibitory proteins that are detected by natural killer cells.
- B) Intraepithelial lymphocytes and natural killer cells possess specific, highly diverse receptors.
- C) Pattern recognition receptors (PRRs) ensure that cells are correctly identified.
- D) Leukocytes possess pathogen-associated molecular patterns (PAMPs)

Ans: C

**Feedback:**

PRRs recognize the structure of invaders and thus prevent activation by healthy somatic cells, though neither intraepithelial lymphocytes nor natural killer cells possess the high level of specification and diversity of receptors associated with the adaptive immune system. Host cells do not excrete inhibitory proteins, and PAMPs exist on pathogens, not on leukocytes.

8. A 60-year-old male client with an acute viral infection is receiving interferon therapy. The physician is teaching the family of the client about the diverse actions of the treatment and the ways that it differs from other anti-infective therapies. Which of the following teaching points listed below should the physician least likely include?
- A) "Interferon can help your father's unaffected cells adjacent to his infected cells produce antiviral proteins that can stop the spread of the infection."
  - B) "Interferon can help limit the replication of the virus that's affecting your father."
  - C) "Interferon helps your father's body recognize infected cells more quickly."
  - D) "Interferon can bolster your father's immune system through the stimulation of natural killer cells that attack viruses."

Ans: D

**Feedback:**

Interferons can activate macrophages in the fight against viral invaders, but they are not noted to stimulate the action of natural killer cells. Answers A, B, and C all capture elements of the action of interferons.

9. Which of the following phenomena would be least likely to result in activation of the complement system?
- A) Recognition of an antibody bound to the surface of a microbe
  - B) Increase in tissue blood flow and capillary permeability, so fluids/proteins can leak into the area
  - C) Activation of toll-like receptors (TLRs) on complement proteins
  - D) Direct recognition of microbial proteins

Ans: C

**Feedback:**

Toll-like receptors are not associated with the complement system. The complement system may be activated by antibody recognition, mannose binding, or microbial protein recognition.

10. A nurse is providing care for a client who is immunocompromised following chemotherapy. The nurse knows which of the following characterizations of the adaptive immune system listed below is responsible for the client's disruption in his normal immune function?
- A) Epitopes on antigens are recognized by immunoglobulin receptors following presentation by accessory cells.
  - B) Haptens combine to form epitopes that stimulate the response of regulatory and effector cells.
  - C) Effector cells orchestrate the immune response of regulatory cells toward an antigen.
  - D) Accessory cells such as macrophages are engulfed by regulatory cells, stimulating effector cells.

Ans: A

**Feedback:**

In the adaptive immune response, accessory cells present antigen epitopes to receptors, initiating the immune response of lymphocytes. Epitopes may combine to form haptens, and regulatory cells orchestrate effector cells. Regulatory cells do not engulf accessory cells.

11. The nurse knows the cells primarily programmed to remove the invading organisms and remember the antigen to respond rapidly during the next exposure are
- A) CD4 and CD8 cells.
  - B) natural killer (NK) cells and macrophages.
  - C) T and B lymphocytes.
  - D) white blood cells and platelets.

Ans: C

**Feedback:**

T and B lymphocytes are unique in that they are the only cells in the body capable of recognizing specific antigens present on the surfaces of microbial agents and other pathogens.

12. A 53-year-old female hospital patient has received a kidney transplant following renal failure secondary to hypertension. As part of the teaching while she was on the organ wait list, she was made aware that she would need to take antirejection drugs for the rest of her life. Which aspect of the immune system underlies this necessity?
- A) The lack of identifiable major histocompatibility complex (MHC) molecules will stimulate the innate immune response.
  - B) Donor organ antibodies will be identified as foreign and stimulate an immune response.
  - C) Antirejection drugs will stimulate the production of familiar MHC molecules.
  - D) MHC molecules will never develop in the cells of the donor organ, and effector cells will be continually stimulated.

Ans: D

**Feedback:**

The lack of familiar MHC molecules will stimulate an immune response by effector cells in the absence of antirejection drugs. An innate immune response is not central to the response, but rather the adaptive immune system. Lack of known MHC molecules, not foreign antibodies, accounts for the immune response, and familiar MHC molecules will not be produced by the donor kidney cells.

13. A client has been inhaling viruses periodically while on a cross-country flight. Which of the following situations listed below would most likely result in the stimulation of the client's T lymphocytes and adaptive immune system?
- A) Presentation of a foreign antigen by a familiar immunoglobulin
  - B) Recognition of a foreign major histocompatibility complex (MHC) molecule
  - C) Recognition of a foreign peptide bound to a self-major histocompatibility complex (MHC) molecule
  - D) Cytokine stimulation of a T lymphocyte with macrophage or dendritic cell mediation

Ans: C

**Feedback:**

The stimulation of T cells requires the recognition of a foreign peptide bound to a self-major histocompatibility complex (MHC) molecule. Immunoglobulins do not play an antigen-presenting role, and foreign MHC molecules and cytokines do not stimulate the adaptive immune system.

14. Three days ago, a mother delivered her full-term infant who had been identified as having an in utero infection. The infant is receiving antibiotic and phototherapy, and the mother is breast-feeding. Which of the following types of immunoglobulins could most reasonably be expected to predominate in the infant's immune system?

A) IgA, IgM, IgD  
B) IgG, IgA, IgM  
C) IgE, IgG, IgD  
D) IgM, IgD, IgA

Ans: B

**Feedback:**

Infants are born with IgG from transfer across the placenta, while IgA is found in colostrum. IgM is indicative of an in utero infection.

15. A middle school student is scheduled to receive booster immunizations, and the father asks the nurse why the booster is necessary. What characteristic of the adaptive immune system listed below would provide the rationale for the nurse's response?

A) Some antibodies require a repeat of the primary immune response.  
B) Some antibodies have a duration measured in months rather than years.  
C) A secondary response causes a sharp rise in antibody levels.  
D) Antigen receptors on CD4<sup>+</sup> cells require multiple exposures separated by time.

Ans: C

**Feedback:**

Booster immunizations take advantage of the increase in antibodies that accompanies a repeat exposure. The primary immune response cannot be repeated, and antibodies survive beyond several months. Antigen receptors on CD4<sup>+</sup> cells do not require multiple exposures.

16. A student states, "It seems like helper T cells do a lot more than just 'help' the cellular immunity process." Which of the following responses listed below best conveys an aspect of the role of CD4<sup>+</sup> helper T cells in immunity?

A) "Without helper T cells, no antigens would be presented."  
B) "Helper T cells play a major role in stimulating and regulating the whole process."  
C) "Without helper T cells, the wrong antibodies would end up being produced."  
D) "Helper T cells are key to the hematopoiesis that produces all the components of the immune system."

Ans: B

**Feedback:**

Helper T cells are central to the regulation, proliferation, and stimulation of the immune system. They do not play a central role in antigen presentation or early hematopoiesis, however. Their absence would not result in incorrect antibody production, but rather insufficient or absent immune response.

17. A newly diagnosed HIV-positive adolescent has blood work drawn, which includes a CD8 T-cell count. The nurse knows which of the following functions of CD8 T cells listed below will assist the adolescent's immune system in fighting off the viral attack? Select all that apply.

- A) Release destructive enzymes
- B) Trigger intracellular programmed death
- C) Cause allergens to surround the virus
- D) Boost antigen–antibody response
- E) Remove foreign material from lymph before it enters the blood

Ans: A, B

**Feedback:**

The primary function of cytotoxic T (CD8) cells is to monitor the activity of all cells in the body and destroy any that threaten the integrity of the body. The CD8 cells destroy target cells by releasing cytolytic enzymes, toxic cytokines, and pore-forming molecules or by triggering membrane molecules and intercellular apoptosis. Removal of foreign material from lymph before it enters the blood is the function of lymph nodes.

18. A 10-year-old child with strep throat asks the nurse, “why there are large bumps [lymph nodes] on my neck when my throat gets sore?” The nurse replies lymph nodes
- A) help your body fight off infections by allowing special cells (lymphocytes and macrophages) move through the lymph chain and engulf and destroy germs.
  - B) bring in cells into the lymph node (your bump) to stop the germs from going anywhere else in the body.
  - C) bring all kind of good cells to your throat so that they can wall the strep off and keep the germs from getting any food or water.”
  - D) help your tonsils get bigger with cells that will bring immune cells into your throat to prevent any other infections.

Ans: A

**Feedback:**

Lymphocytes and macrophages move slowly through the lymph nodes so that they can have adequate time to engulf microorganisms and interact with circulating antigens. The lymph nodes do not bring cells into the node to stop germs; do not bring cells to the throat to wall off strep; and do not enlarge the tonsil with immune cells.



19. Which of the following situations can best be characterized as an example of passive immunity?
- A) A 6-month-old infant receives his scheduled immunization against measles, mumps, and rubella.
  - B) A 9-year-old boy is immune to chicken pox after enduring the infection before 1 year.
  - C) An 8-year-old girl recovers from a respiratory infection after intravenous antibiotic treatment.
  - D) A 6-week-old infant receives antibodies from his mother's breast milk.

Ans: D

**Feedback:**

Passive immunity involves the transfer of antibodies from an outside source, such as those from breast milk. Immunization and recovery from illness involve active immunity.

20. The nurse knows high incidences of infectious illnesses among the older adults who reside in a long-term care facility are most likely to have diminished immune capacity because of
- A) decreased numbers and responsiveness of T lymphocytes.
  - B) decreased antigen recognition by B lymphocytes.
  - C) overexpression of cytokines and receptors.
  - D) altered function in peripheral lymphocytes.

Ans: A

**Feedback:**

Although this phenomenon is not well understood, increasing proportions of lymphocytes become unresponsive with age, and CD4<sup>+</sup> T lymphocytes are the most severely affected. B lymphocytes recognize more antigens, not fewer, and expression of cytokines and their cellular receptors decreases.

## Chapter 12-a- Disorders of the Immune Response

1. After years of going to different physicians with vague symptoms, a 55-year-old client with a history of Hodgkin disease has been diagnosed with a secondary immunodeficiency syndrome. The client asks the nurse what this means. The nurse knows from the following list of characteristics that secondary immunodeficiency disorders: Select all that apply.

- A) may be inherited as a sex-linked trait.
- B) usually develop later in life.
- C) may be a result of chemotherapy being used to treat a cancer.
- D) can result from frequent recurring *Staphylococcus aureus* infections.
- E) can occur in a chronic obstructive pulmonary disease patient taking corticosteroids daily.

Ans: B, C, E

**Feedback:**

Secondary immunodeficiency disorders develop later in life as a result of other pathophysiologic states such as malnutrition, disseminated cancers, infection of the cells of the immune system, and treatment with immunosuppressive drugs, such as chemotherapeutic agents. Primary disorders may be congenital or inherited as sex-linked, autosomal dominant, or autosomal recessive traits. Humoral (B-cell) immunodeficiencies are primarily associated with recurrent infections like *Staphylococcus aureus*.

2. A 2-year-old girl has had repeated ear and upper respiratory infections since she was born. A pediatrician has determined a diagnosis of transient hypogammaglobulinemia of infancy. What is the physiological origin of the child's recurrent infections?

- A) The child's immune system is unable to synthesize adequate immunoglobulin on its own.
- B) The child had a congenital absence of IgG antibodies that her body is only slowly beginning to produce independently.
- C) The child was born with IgA and IgM antibodies, suggesting intrauterine infection.
- D) The child lacks the antigen-presenting cells integral to normal B-cell antibody production.

Ans: A

**Feedback:**

Transient hypogammaglobulinemia of infancy is characterized by inadequate communication between B and T cells. IgG would be inherited through placental blood, and an intrauterine infection is neither causative or nor synonymous with transient hypogammaglobulinemia of infancy. The diagnosis does not include a lack of antigen-presenting cells.

3. A nurse is providing care for a 17-year-old boy who has experienced recurrent sinus and chest infections throughout his life and presently has enlarged tonsils and lymph nodes. Blood work indicated normal levels of B cells and free immunoglobulins but a lack of differentiation into normal plasma cells. The boy is currently receiving intravenous immunoglobulin (IVIG) therapy. What is the boy's most likely diagnosis?

A) X-linked hypogammaglobulinemia  
B) Transient hypoglobulinemia  
C) Common variable immunodeficiency  
D) IgG subclass deficiency

Ans: C

**Feedback:**

The lack of a terminal differentiation from B cells into plasma cells is the hallmark of common variable immunodeficiency. Recurrent infections, enlarged lymph nodes and tonsils, and IVIG therapy are also commonly associated.

4. Which of the following patients is most likely to benefit from transplantation of thymic tissue or major histocompatibility complex (MHC)-compatible bone marrow?

A) A 12-year-old girl with a history of epilepsy and low IgG levels secondary to phenytoin use  
B) A 7-year-old boy whose blood work indicates decreased IgA and IgG with increased IgM  
C) A 6-year-old boy whose pre-B cells are incapable of translation to normal B cells  
D) A 9-year-old girl who has a diagnosis of IgA deficiency

Ans: B

**Feedback:**

Decreased IgA, IgE, and IgG with increased IgM levels are characteristic of X-linked immunodeficiency with hyper-IgM, a primary cell-mediated immunodeficiency that would respond to thymic tissue transplantation and MHC-compatible bone marrow. Low IgG levels secondary to phenytoin use, X-linked hypogammaglobulinemia, and selective IgA deficiency are unlikely to be treated with the T-cell-focused treatments like thymic tissue transplantation and MHC-compatible bone marrow.

5. An 8-week-old boy has been recently diagnosed with a severe combined immunodeficiency (SCID). His parents have performed a significant amount of research on the Internet and have brought a large amount of material to discuss with their care provider. Which of the following statements best reflects an accurate understanding of their son's health situation?
- A) "We read that gene therapy could cure our son; we'd like you to look into that option."
  - B) "Our son likely has a deficiency of B lymphocytes and can't produce antibodies."
  - C) "We feel guilty, because dietary and environmental factors have been shown to contribute to SCID"
  - D) "The antibodies that our son produces are mismatched to the infections that he was born with and encounters."

Ans: B

**Feedback:**

The pathophysiology of SCID involves normal B cells but a lack of antibody production because of inadequate T-cell help. Gene therapy is not yet a realistic treatment option, and the disease has a genetic basis. Antibodies are not incorrect but rather inadequate in number.

6. A 1-year-old child who has experienced low platelet counts and bacterial susceptibility has been admitted to a pediatric medical unit of a hospital for treatment of Wiskott-Aldrich syndrome. The nurse who has admitted the child to the unit would anticipate which of the following short-term and longer-term treatment plans?
- A) Transfusion of clotting factors XII and XIII and serum albumin; splenectomy
  - B) Neutropenic precautions; fresh frozen plasma transfusions; treatment of gastrointestinal symptoms
  - C) Intravenous immunoglobulin (IVIG) treatment; thyroidectomy
  - D) Treatment of eczema; management of bleeding; bone marrow transplant

Ans: D

**Feedback:**

Common interventions for Wiskott-Aldrich syndrome involve controlling eczema, managing bleeding due to low platelets, and ultimately bone marrow transplant. The other noted interventions are not associated with the treatment of Wiskott-Aldrich syndrome.

7. A nurse has just learned that her child has a life-threatening complement disorder known as hereditary angioneurotic edema (HAE). Due to deficiency in C1-INH, the nurse needs to be prepared for which possible life-threatening clinical manifestation?
- A) Bulging eyeballs
  - B) Swelling of the airway
  - C) Compressed carotid arteries
  - D) Compression of brachial nerves

Ans: B

**Feedback:**

HAE is a rare, life-threatening complement disorder that results from deficiency of C1-inhibitor (HAE-C1-INH). It is an inherited autosomal dominant trait that causes mutation in the 11th chromosome. Deficiencies in C1-INH result in uncontrolled release of vasoactive substances that promote vascular permeability. The net result is the development of swelling in the subcutaneous tissues of the extremities, face/torso, or upper airway and GI tract. Laryngeal edema is a life-threatening manifestation that can lead to complete airway obstruction and death without interventions.

8. A 4-year-old boy presents with a chronic cough and swollen lymph nodes. His records show that he has been given antibiotics several times in the past year with limited success, most recently for a liver abscess, and that he also has a recurring fungal skin condition. Which of the following is his most likely diagnosis?
- A) Selective IgA deficiency
  - B) A deficiency in IgG<sub>2</sub> subclass antibodies
  - C) Chronic granulomatous disease
  - D) Ataxia–telangiectasia

Ans: C

**Feedback:**

Chronic granulomatous disease, because it affects phagocytic function, increases susceptibility to soft tissue infections, particularly of the skin, lungs, lymph nodes, and liver. Selective IgA deficiency and deficient IgG<sub>2</sub> subclass antibodies can predispose people to infection, but those infections respond readily to antibiotic treatment. Ataxia–telangiectasia can cause skin and liver problems, but its primary manifestations are ataxia and telangiectasia.

9. A patient diagnosed with a primary immunodeficiency disorder has asked his siblings to be tested as possible stem cell donors. When discussing this procedure with his family, the nurse emphasizes that stem cells can be harvested from: Select all that apply.

- A) bone marrow.
- B) peripheral blood.
- C) skin tissue harvesting.
- D) mouth swabs.
- E) tears.

Ans: A, B

**Feedback:**

Hematopoietic stem cells can be harvested from either the bone marrow or the peripheral blood and also from the umbilical cord blood. From sibling donors, the results are effective with improved survival in approximately 90% of people.

10. When explaining what is occurring when their child has an acute bronchial asthma attack, the nurse will emphasize that which mediator is primarily responsible for the bronchial constriction?

- A) Tree pollen
- B) Mold dust
- C) Histamine
- D) T-lymphocyte proliferation

Ans: C

**Feedback:**

Asthma response begins within 5 to 30 minutes of exposure to an allergen. It is mediated by mast cell degranulation and the release of preformed and/or enzymatically activated mediators. These mediators include histamine, serotonin, and acetylcholine. Histamine is the most recognized mediator of type I hypersensitivity reactions and ultimately results in bronchial constriction.

11. A male elementary school student has a severe allergy to peanuts and is displaying the signs of anaphylactic shock after inadvertently eating a peanut-containing candy bar. Which of the following statements best captures the boy's current status and preferred treatment?
- A) He is experiencing shortness of breath caused by potent vasoconstriction that can be relieved by epinephrine injection.
  - B) He is approaching vascular shock and developing edema due to actions of IgE antibodies, situations that can be reversed by administration of epinephrine.
  - C) His mast cells and basophils have been sensitized, but systemic effects can be mitigated by administration of bronchodilators.
  - D) He is likely in a primary- or initial-stage allergic response that can be relieved by antihistamine administration.

Ans: B

**Feedback:**

Anaphylactic reactions are often accompanied by vascular shock and edema, and the normal treatment is epinephrine injection. Symptoms are caused by vasodilation, not vasoconstriction; bronchodilators are not the ideal treatment.

12. A 40-year-old woman who experiences severe seasonal allergies has been referred by her family physician to an allergist for weekly allergy injections. The woman is confused as to why repeated exposure to substances that set off her allergies would ultimately benefit her. Which of the following phenomena best captures the rationale for allergy desensitization therapy?
- A) Repeated exposure to offending allergens binds the basophils and mast cells that mediate the allergic response.
  - B) Allergens in large, regular quantities overwhelm the IgE antibodies that mediate the allergic response.
  - C) Repeated exposure stimulates adrenal production of epinephrine, mitigating the allergic response.
  - D) Injections of allergens simulate production of IgG, combining with the antigens to prevent activation of IgE antibodies.

Ans: D

**Feedback:**

Repeated exposure to allergens causes an increase in IgG, which binds with antigens before they can stimulate IgE. It does not bind mast cells or basophils, nor does it overwhelm the IgE antibodies to stimulate epinephrine production.

13. A 24-year-old woman has gone to the OB-GYN clinic for her first visit since she found out she was pregnant. The clinician tested her blood type along with the usual prenatal testing. On a follow-up visit, the woman was told that she is Rh negative. When asked what that means for her baby, the nurse explains that Rh-negative women lack RhD antigens on their erythrocytes but produce anti-D antibodies. As a result of this blood type,
- A) "If you and your baby have mismatched blood, it can invoke anaphylaxis in the baby."
  - B) "If the types are incompatible, severe antibody-mediated inflammation occurs."
  - C) "If blood types do not match, the baby's liver will produce extra cells to replace RBCs needed to oxygenate organs."
  - D) "If the fetus is Rh positive, maternal anti-D antibodies can coat fetal RBCs resulting in severe anemia."

Ans: D

**Feedback:**

In utero, the development of erythroblastosis fetalis (Rh incompatibility) results when Rh-negative women produce anti-D antibodies. In Rh-positive fetus, maternal anti-D antibodies will coat fetal RBCs containing RhD, allowing them to be removed from the fetal circulation by macrophage- and monocyte-mediated phagocytosis (destroying RBCs). RBCs are produced in the bone marrow, not the liver; therefore, answer C is incorrect.

14. A 67-year-old patient diagnosed with myasthenia gravis will likely display which clinical manifestations as a result of autoantibodies ultimately blocking the action of acetylcholine, resulting in destruction of the receptors?
- A) Weakness of the eye muscles; difficulty in swallowing and slurred speech; impaired gait
  - B) Tremor of hands/arms; rigidity of the arms; shuffling gait
  - C) Short-term memory lapses; problems with orientation; a lack of drive or initiative
  - D) Facial droop; slurred speech; weakness on one side of the body

Ans: A

**Feedback:**

Myasthenia gravis ultimately results in destruction of receptors in the neuromuscular junction leading to a decrease in neuromuscular function. Answer B relates to s/s of Parkinson disease; answer C relates to Huntington disease; and answer D relates to classic s/s of CVA.



15. Following a spider bite she received while camping, a 20-year-old female presented to the emergency department with rash, edema, and fever and was subsequently diagnosed with serum sickness. Which of the following statements best conveys the physiological rationale for the broad systemic effects of this event?
- A) The woman is experiencing diffuse tissue necrosis as a consequence of an Arthus reaction.
  - B) Antigen–antibody complexes have been deposited in a variety of locations throughout the body.
  - C) Antibody binding to specific target cell receptors is bringing about a change in cell function.
  - D) Deposited antibodies are activating her complement system.

Ans: B

**Feedback:**

Serum sickness is characterized by the deposition of antigen–antibody complexes in blood vessels, joints, heart, and kidney tissue. The deposited complexes activate complement, increase vascular permeability, and recruit phagocytic cells, all of which can promote focal tissue damage and edema. Serum sickness is not synonymous with an Arthus reaction. Antibody binding to specific target cell receptors causing a change in cell function is characteristic of antibody-mediated cellular dysfunction. Serum sickness is not associated with the activation of the complement system.

16. A new nursing student is taking a tuberculin (TB) skin test as part of her preparation for beginning clinical placement in the hospital. The student is unclear of the rationale or physiology involved in this test. Which of the following is the correct explanation?
- A) The cell-mediated hypersensitivity associated with *Mycobacterium tuberculosis* remains detectable for several years.
  - B) Formation of contact dermatitis lesions confirms prior TB contact.
  - C) Previous TB exposure forms sensitized  $T_H1$  cells that are long-lived.
  - D) This type of delayed-type hypersensitivity (DTH) is a response to latent *Mycobacterium tuberculosis* bacteria.

Ans: C

**Feedback:**

Sensitized  $T_H1$  cells form DTH response to introduced antigens. This is not an example of cell-mediated hypersensitivity or contact dermatitis, and it is not a response to latent *Mycobacterium tuberculosis*.

17. A female dental assistant has developed signs and symptoms of a latex sensitivity and is undergoing allergy testing as well as blood work. Which of the following components of the assistant's blood work would most likely be the focus of her health care provider's analysis?

- A) Analysis of class II MHC antigens
- B) Serum IgE immunoassays
- C) Serum B-lymphocyte levels
- D) Serum CD8<sup>+</sup> levels

Ans: B

**Feedback:**

Latex sensitivity can be either a type I or type IV reaction. Though T<sub>H</sub>1 levels are relevant in a type IV reaction, IgE analysis is the most common component of relevant blood work. MHC and CD8<sup>+</sup> levels are unlikely to be considered.

18. While undergoing a kidney transplant from a nonfamily member, the patient's transplanted kidney has just had the arterial clamps removed. The OR staff notice that the organ is turning purple with no urine output. When explaining to the family why they had to remove the donor kidney, the nurse will anticipate that the surgeon would likely include which statement?

- A) Obviously, there has been a mismatch during the human leukocyte antigen (HLA) testing.
- B) The circulating B and T lymphocytes are just doing their job.
- C) Hyperacute rejection occurs because antibodies against HLA antigens are deposited in vessels causing necrosis.
- D) Previous exposure to the HLA antigens is responsible for the high titers of complement fixing antibodies that cause the rejection.

Ans: C

**Feedback:**

Antibody-mediated rejection can be hyperacute, which occurs almost immediately after vascular reperfusion to graft tissue occurs. Performed antibodies against HLA antigens are deposited in the tissue endothelium and microvasculature where they activate the classic complement pathway causing tissue necrosis and graft injury.

19. After several months on a waiting list, a 44-year-old male received a liver transplant 5 days ago. In the last 36 hours, he has developed a rash beginning on his palms and soles, along with abdominal pain and nausea. It has been determined by his care team that the immune response that is causing his symptoms originates not with his own compromised immune components but with those introduced with his new organ. This man's most likely medical diagnosis is
- A) graft versus host disease (GVHD).
  - B) acute transplant rejection.
  - C) hyperacute organ rejection.
  - D) T-cell-mediated graft rejection.

Ans: A

**Feedback:**

Rash, gastrointestinal involvement, and pernicious activity by donor immune cells are the hallmarks of GVHD. The description does not suggest acute or hyperacute transplant rejection, and T-cell-mediated rejection is not a diagnosis in and of itself, but rather one of the mechanisms of transplant rejection.

20. In the context of a workshop on rheumatoid arthritis, a clinical educator is teaching a group of nurses about autoimmune diseases. Which of the following statements by an attendee would the educator most likely want to follow up with further teaching?
- A) "Introduction of a foreign antigen can sometimes induce a cascade of immune response that is not self-limiting"
  - B) "Often the problem can be traced to antigens that sensitize T cells without the need for presentation."
  - C) "In some cases, the body attacks its own cells that are chemically similar to those of infectious organisms."
  - D) "Sometimes when the body's own cells are released after a long time, they are interpreted as being foreign."

Ans: A

**Feedback:**

Autoimmune responses are not considered to be uncontrolled cascades of immune response that are catalyzed by introduction of an antigen. Superantigens are able to forego the normal antigen presentation process and directly stimulate T-cell response, resulting in overactivation of T cells. Molecular mimicry involves the misidentification of somatic cells as similar foreign cells, and self-antigens that have been sequestered for long periods can invoke an immune response.

## Chapter 12-b- HIV\_ Acquired Immunodeficiency Syndrome

1. While teaching about HIV/AIDS to a group of high school seniors, the school health nurse will begin by explaining the basic facts that will likely include which of the following information?
  - A) Like all viruses, HIV is a genetic material made from DNA with long molecules that carry genetic information.
  - B) HIV is different from other viruses since it is a retrovirus that selectively attacks the body's immune cells.
  - C) There are two types of HIV, but the one that is endemic to the United States is HIV type 2.
  - D) HIV type 1 for some reason rarely develops into full-blown AIDS.

Ans: B

**Feedback:**

HIV is a retrovirus that selectively attacks the CD4<sup>+</sup> T lymphocytes, the immune cells responsible for orchestrating and coordinating the immune response to infection. It must change from RNA to DNA through a series of stages in order to get in a cell and begin replication. HIV type 2 is endemic in West Africa but is rarely seen in other parts of the world. People with HIV-2 tend not to develop AIDS.

2. As part of her prenatal education, a 29-year-old woman who is pregnant with her first child is receiving teaching from her primary care provider. Which of the following statements by the woman reflects an accurate understanding of HIV transmission?
  - A) "I know my baby is safe from HIV while in the womb, but the delivery will place him or her at real risk."
  - B) "It's discouraging to know that my breast milk can pass on HIV to my baby."
  - C) "I know it's possible, but it's comforting that the chances of my child contracting my HIV are actually very low."
  - D) "I'm relieved to learn that a caesarean delivery will protect my baby from being born HIV positive."

Ans: B

**Feedback:**

Transmission from mother to infant is the most common way that children become infected with HIV. HIV may be transmitted from infected women to their offspring in utero, during labor and delivery, or through breast-feeding. Ninety percent of infected children acquired the virus from their mother. The risk of transmission of HIV from mother to infant is approximately 25%, with estimates ranging from 15% to 45%, depending on what country they live in.

3. A potential donor is angry at the personal nature of the questions about HIV risk factors that he is required to answer at a blood collection center and states that simple blood testing should suffice. How can the nurse at the center best respond?
- A) "There are some very uncommon subtypes of the HIV virus that are not detectable by current testing methods."
  - B) "There's a chance that persons who are asymptomatic, but HIV positive can have their antibodies missed by serum testing."
  - C) "There's a period shortly after someone is infected with HIV when blood tests might still be negative."
  - D) "Even though blood tests are completely accurate, the high stakes of blood donation and transfusion mean that double measures are appropriate."

Ans: C

**Feedback:**

The time after infection and before seroconversion is known as the window period, during which HIV antibody screening may be negative. Potential donors are thus screened to identify potential risk factors. Undetectable subtypes of HIV do not exist, and individuals who are asymptomatic are still able to be accurately tested.

4. A 40-year-old male who has been HIV positive for 6 years is experiencing a new increase in his viral load along with a corresponding decrease in his CD4<sup>+</sup> count. Which of the following aspects of his immune system is likely to remain most intact?
- A) Presentation of major histocompatibility molecules on body cells
  - B) Orchestration of natural killer cells as part of cell-mediated immunity
  - C) Activation of B lymphocytes
  - D) Phagocytic function of monocytes and macrophages

Ans: A

**Feedback:**

The expression of MHC on various cells of the body is not noted to be directly influenced by HIV. However, infected CD4<sup>+</sup> cells are compromised in their ability to guide the action of NK cells, to direct phagocytic function of macrophages, and to present antigens that activate B cells.

5. A 19-year-old intravenous drug user was exposed to the HIV 3 weeks ago and is experiencing a rapid proliferation in viral load. Which of the following statements best captures an aspect of the process of HIV replication that underlies this proliferation?
- A) Free HIV RNA is able to attach to the cell coat of CD4<sup>+</sup> cells.
  - B) The cytoplasm of CD4<sup>+</sup> cells provides a protected environment for the replication of RNA by HIV.
  - C) Expression of reverse transcriptase by CD4<sup>+</sup> cells allows replication of HIV cells rather than new lymphocytes.
  - D) HIV is able to change its RNA into DNA to allow for replication by CD4<sup>+</sup> cells.

Ans: D

**Feedback:**

In order for the HIV to reproduce, it must change its RNA into DNA. It does this by using the reverse transcriptase enzyme. Reverse transcriptase makes a copy of the viral RNA and then in reverse makes another mirror-image copy. The result is double-stranded DNA that carries instructions for viral replication. HIV RNA does not directly attach to CD4<sup>+</sup> cells, and RNA is not replicated by HIV itself in the CD4<sup>+</sup> cytoplasm. Reverse transcriptase is not produced by CD4<sup>+</sup> cells, and CD4<sup>+</sup> cells do not directly produce new lymphocytes.

6. Utilizing the World Health Organization (WHO) framework of clinical categories for persons with acquired immunodeficiency syndrome (AIDS) over 15 years of age, a visitor to the United States goes to a city clinic complaining of diarrhea, weight loss of 20 lb, and feeling like he is running a temperature. These manifestations have been occurring for the past 5 weeks. The nurse would identify this patient to be in which clinical stage?
- A) Stage 1
  - B) Stage 2
  - C) Stage 3
  - D) Stage 4

Ans: C

**Feedback:**

*Clinical stage 3* includes unexplained chronic diarrhea for greater than 1 month, persistent oral candidiasis, oral hairy leukoplakia, TB, neutropenia, anemia, and thrombocytopenia.

7. Which of the following patients would be considered to be in the latent period of HIV infection?
- A) A 16-year-old prostitute who has open sores on her labia that drain purulent secretions
  - B) A 33-year-old heroin drug abuser who has numerous enlarged lymph nodes in his axilla and cervical neck region for the past 4 months
  - C) A 45-year-old alcohol abuser who is complaining of excessive vomiting of blood that started 2 weeks ago
  - D) A 24-year-old college student who has developed a chronic cough that will not go away, even after taking two courses of antibiotics.

Ans: B

**Feedback:**

In the latent period, which can last up to 10 years, the CD4<sup>+</sup> count falls gradually to approximately 200 cells/ $\mu$ L. Some people experience swollen lymph nodes that are chronically swollen for more than 3 months in at least two locations, not including the groin. The lymph nodes may be sore or visible externally.

8. A person who has been diagnosed with HIV infection 12 years ago and still has a CD4<sup>+</sup> cell count of 800 cells/ $\mu$ L and a low viral load is considered clinical to be a
- A) rapid progressor.
  - B) typical progressor.
  - C) slow progressor.
  - D) long-term nonprogressor.

Ans: D

**Feedback:**

There is a subset of slow progressors: the long-term nonprogressors, who account for 1% of all HIV infections. These people have been infected for at least 8 years, are antiretroviral naive, have high CD4<sup>+</sup> cell counts, and usually have very low viral loads. They are being investigated to determine how they maintain viral suppression of HIV.

9. A 39-year-old female with HIV infection has been characterized as a typical progressor by her care team and is experiencing an increase in her manifestations and health complaints as her CD4<sup>+</sup> count declines. Which of the following health problems would her care team most likely attribute to a cause other than her HIV?
- A) Her recent diagnosis of bacterial pneumonia
  - B) Her esophagitis that has been linked to herpes simplex infection
  - C) Her decreased bone density and recent fractures
  - D) Her increasing confusion and disorientation

Ans: C

**Feedback:**

While pneumonia, esophagitis, and cognitive deficits are all well-documented manifestations of HIV, changes in bone density are less likely to be a direct result of the virus.

10. A patient comes into a clinic complaining of cough, fever, and shortness of breath. The patient informs the health care provider that he is HIV positive. Upon physical exam, the family nurse practitioner (FNP) may note which of the following clinical manifestations of suspected *Pneumocystis jiroveci* pneumonia (PCP)? Select all that apply.

- A) Interstitial infiltrates on chest x-ray
- B) Respiratory rate of 32 with normal breath sounds
- C) Stridor when taking a deep breath
- D) Use of abdominal muscles to breathe while sitting on the exam table
- E) Night sweats that require clothing changes frequently throughout the night

Ans: A, B

**Feedback:**

PCP is a common presenting manifestation of AIDS or people with compromised immune systems. The symptoms include cough, fever, shortness of breath, and weight loss. Physical exam demonstrates only fever and tachypnea (elevated respiratory rate) and normal breath sounds. Chest x-ray shows interstitial infiltrates. Night sweats are usually associated with tuberculosis infection.

11. Members of an AIDS support group who have more advanced cases are sharing some of their recent health problems with a member who has just been diagnosed. Which of the member's statements is most accurate?

- A) "One of the scariest things out there now is the huge increase in drug-resistant tuberculosis."
- B) "The eradication of *Pneumocystis jiroveci* pneumonia (PCP) has helped extend the life expectancy of a lot of persons living with AIDS."
- C) "Those of us with HIV are so much more prone to loss of vision and hearing."
- D) "As people with HIV live longer, most of us are eventually succumbing to the cancers that are associated with HIV."

Ans: D

**Feedback:**

There is an increased risk of AIDS-associated cancers as persons with age live longer. Drug resistance in tuberculosis is on the decline in recent years, and PCP has not been eradicated. Sensory loss is not a noted HIV-related manifestation.



12. A 48-year-old man who has been HIV positive for 6 years has just learned that he has been diagnosed with Kaposi sarcoma (KS). Which of the following facts most accurately conveys an aspect of his diagnosis?

- A) An opportunistic Epstein-Barr virus underlies the man's KS.
- B) He is likely to have lesions on his skin, mouth, or GI tract.
- C) Intense pain was probably his first manifestation of KS.
- D) Heterosexual contact most likely underlies his HIV and subsequent KS.

Ans: B

**Feedback:**

The lesions of KS can be found on the skin and in the oral cavity, gastrointestinal tract, and the lungs. More than 50% of people with skin lesions also have gastrointestinal lesions. It is linked with a herpes virus and can often be painless, especially in early stages. Men who have sex with men are at a higher risk of developing KS.

13. Which of the following signs and diagnostic findings are recognized components of the metabolic and morphologic changes that occur with HIV infection accompanied with lipodystrophy? Select all that apply.

- A) Hyperlipidemia
- B) Insulin resistance
- C) Deficiencies of anterior pituitary hormones
- D) Increased abdominal girth
- E) Breast enlargement

Ans: A, B, D, E

**Feedback:**

Hyperlipidemia and insulin resistance are aspects of lipodystrophy, a phenomenon that also frequently includes breast enlargement and increased abdominal girth. Pituitary hormone deficiencies are not a noted component of HIV-related metabolic changes.

14. When counseling a male patient with suspected HIV, the nurse informs him that if the enzyme-linked immunosorbent assay (ELISA) comes back positive, then

- A) no further testing is required since this confirms HIV infection.
- B) a second test known as the Western blot assay will be ordered to confirm positive HIV status.
- C) he will be sent to an infectious disease physician for a tissue biopsy to confirm infection.
- D) if the second test, the Western blot, returns negative, he has not developed a case of full-blown AIDS.

Ans: B

**Feedback:**

If ELISA is positive, his blood sample is then sent for Western blot assay. If the Western blot is positive, diagnosis of HIV is confirmed. If the Western blot is negative, then the person is not infected with HIV.

15. A school nurse is teaching high school students about HIV and AIDS in the context of the school's sexual health curriculum. Which of the students' following statements would the nurse most likely want to correct or clarify?

- A) "They have to take a blood sample from you in order to test you for AIDS."
- B) "Drugs for AIDS reduce the virus in your body, but they don't get rid of it."
- C) "Lots more heterosexual people get HIV these days than they used to."
- D) "Condoms provide really good protection from AIDS."

Ans: A

**Feedback:**

Oral tests now exist for preliminary diagnosis of HIV. Medications for AIDS do not cure the disease, and incidence is increasing among heterosexuals. Condoms provide effective protection from the virus.

16. Which of the following individuals would most likely be placed on highly active antiretroviral therapy (HAART) if he or she were not yet receiving the treatment? Select all that apply.

- A) A 35-year-old female sex trade worker who is HIV negative but who has a documented history of sharing needles for heroin use
- B) A 46-year-old male with long-standing HIV and a CD4<sup>+</sup> count of 125 cells/mL
- C) A 16-year-old female who was diagnosed with HIV 2 days prior and is asymptomatic with normal CD4<sup>+</sup> levels
- D) A 38-year-old woman who has a CD4<sup>+</sup> count of 250 cells/mL and is keen to begin HAART
- E) Prophylactically to a health care worker who incurred a laceration from a scalpel used in surgery but has no abnormal lab results

Ans: B, D

**Feedback:**

All symptomatic patients should be treated with antiretroviral therapy. If the individual is asymptomatic, therapy is recommended for CD4<sup>+</sup> cell counts less than or equal to 160/mL. For those who have a CD4<sup>+</sup> cell count greater than 350 cells/mL, antiretroviral therapy is generally not recommended. For those whose CD4<sup>+</sup> cell count is 160 to 350 cells/mL, then antiretroviral therapy should be considered, and a decision individualized to the patient should be made. HAART is not begun prophylactically in the absence of HIV.

17. A 37-year-old male with HIV who has recently become symptomatic has begun highly active antiretroviral therapy (HAART). Among the numerous medications that the man now regularly takes are several that inhibit the change of HIV RNA to DNA in a CD4<sup>+</sup> cell. Which of the following classes of medications addresses this component of the HIV replication cycle?

A) Entry inhibitors  
B) Protease inhibitors  
C) Integrase inhibitors  
D) Non-nucleoside reverse transcriptase inhibitors

Ans: D

**Feedback:**

*Reverse transcriptase inhibitors* inhibit HIV replication by acting on the enzyme reverse transcriptase. Non-nucleotide reverse transcriptase inhibitors block the copying of RNA into DNA. Entry inhibitors, protease inhibitors, and integrase inhibitors do not address this aspect of the HIV replication cycle.

18. All antiretroviral medications interfere with some stage of the HIV life cycle. What stage do protease inhibitors prevent?

A) Cleavage of the polyprotein chain into the individual proteins that will be used to make new virus  
B) Addition of more nucleosides to the DNA chain  
C) Killing of the CD4<sup>+</sup> T cell to release virions into the bloodstream  
D) Attachment of the virus to CD4<sup>+</sup> cell receptors

Ans: A

**Feedback:**

By binding to the protease enzyme and inhibiting its function, protease inhibitors prevent cleavage of the polyprotein chain into individual proteins. Virions are still released into the body, but they are immature and noninfectious.

19. A 23-year-old HIV-positive woman in the United States with routinely low viral loads and robust CD4<sup>+</sup> cell counts is planning to get pregnant. Which precaution would her care giver eliminate from her care?

- A) Offer her HAART that includes zidovudine
- B) Counsel her not to breast-feed
- C) Give her single-dose perinatal nevirapine
- D) Give the infant trimethoprim–sulfamethoxazole, starting at 4 to 6 weeks of age

Ans: C

**Feedback:**

Single-dose nevirapine is an appropriate alternative when zidovudine is not available. However, HAART-containing zidovudine is readily available in the United States. Avoiding breast-feeding will reduce the client's chances of transmitting HIV to her infant. Because the risk of transmission is not zero, prophylaxis with trimethoprim–sulfamethoxazole will protect her infant from PCP until its serostatus is known.

20. While volunteering in an HIV clinic in a big city, the nurse notices a new mom and her baby (a 6-month-old male) in the waiting room. Upon assessing the infant for possible HIV infection, the nurse will be assessing for which of the following clinical manifestations of HIV infection? Select all that apply.

- A) Weighing him to determine if he is gaining 1.5 to 2 lb/month
- B) Observing to see if he can roll over from back to stomach
- C) Lack of coordination to play with toys/stuffed animals
- D) History of repeated episodes of bacterial pneumonia and ear infections
- E) Listlessness and poor eye contact

Ans: C, D, E

**Feedback:**

Children differ as to their clinical presentation of HIV infection when compared to adults. Failure to thrive (gain weight/height), CNS abnormalities (listlessness), and developmental delays are the most prominent primary manifestation of HIV infection in children. Answers A and B are normal growth and developmental tasks of a 6-month-old.

## Chapter 13- Organization and Control of Neural Function

1. The nurse knows which of the following phenomena listed below is an accurate statement about axonal transport?
- A) Anterograde and retrograde axonal transport allow for the communication of nerve impulses between the neuron and the central nervous system (CNS).
  - B) Materials can be transported to the nerve terminal by either a fast or slow component.
  - C) The unidirectional nature of the axonal transport system protects the CNS against potential pathogens.
  - D) Axonal transport facilitates the movement of electrical impulses but precludes the transport of molecular materials.

Ans: B

**Feedback:**

The bidirectional axonal transport system allows for the transport of molecular materials (as opposed to electrical impulses); anterograde transport has both slow and fast components.

2. An adult male has a new diagnosis of Guillain-Barré syndrome. The nurse knows which of the following pathophysiological processes underlie the deficits that accompany the degeneration of myelin in his peripheral nervous system (PNS)?
- A) The destruction of myelin causes fewer Schwann cells to be produced in the client's PNS.
  - B) The axonal transport system is compromised by the lack of myelin surrounding nerve cells.
  - C) Unless remyelination occurs, the axon will eventually die.
  - D) A deficit of myelin predisposes the client to infection by potential pathogens.

Ans: C

**Feedback:**

In some pathologic conditions, the myelin may degenerate or be destroyed. This leaves a section of the axonal process without myelin while leaving the nearby oligodendroglial or Schwann cells intact. Unless remyelination takes place, the axon eventually dies. A lack of myelin is associated with reduced insulation and impulse conduction. Schwann cells produce myelin, not vice versa, and the myelin is responsible for neither the axonal transport system nor protection against pathogens.

3. While assessing a critically ill patient in the emergency department, the nurse notes on the cardiac monitor an R-on-T premature ventricular beat that develops into ventricular tachycardia (VT). Immediately, the patient became unresponsive. The nurse knows that based on pathophysiologic principles, the most likely cause of the unresponsiveness is
- A) metabolic acidosis that occurs spontaneously following any dysrhythmias.
  - B) interruption of the blood/oxygen supply to the brain.
  - C) massive cerebrovascular accident (CVA) resulting from increased perfusion.
  - D) a blood clot coming from the heart and occluding the carotid arteries.

Ans: B

**Feedback:**

The brain receives 15% to 20% of the total resting cardiac output and consumes 20% of its oxygen. The brain cannot store oxygen or engage in anaerobic metabolism. An interruption of blood or oxygen supply to the brain rapidly leads to clinically observable signs and symptoms. Unconsciousness occurs almost simultaneously with cardiac arrest. Metabolic acidosis will occur later in the cardiac arrest but not immediately and is not responsible for the patient's unresponsiveness. CVAs can be caused by thrombosis formation or plaque occlusions, but it is not the primary reason for unconsciousness in VT.

4. When educating a patient about to undergo a pacemaker insertion, the nurse explains the normal phases of cardiac muscle tissue. During the repolarization phase, the nurse will stress that membranes must be repolarized before they can be reexcited. Within the cell, the nurse understands that
- A) potassium channels open while sodium channels close, causing repolarization to the resting state.
  - B) the influx of calcium is the primary stimulus for the repolarization of cardiac tissue.
  - C) only the electrical activity within the heart will determine when repolarization occurs.
  - D) the cell membranes need to stay calm resulting in muscle tissue becoming refractive.

Ans: A

**Feedback:**

Repolarization is the phase during which the polarity of the resting membrane potential is reestablished. This occurs with the closure of the sodium channels and opening of the potassium channels.

5. A client with a diagnosis of depression has been prescribed a medication that ultimately increases the levels of the neurotransmitter serotonin between neurons. Which of the following processes will accompany the actions of the neurotransmitter in a chemical synapse?
- A) Two-way communication between neurons is permitted in contrast to the one-way communication in electrical synapses.
  - B) Communication between a neuron and the single neuron it is connected with will be facilitated.
  - C) The neurotransmitter will cross gap junctions more readily.
  - D) More neurotransmitters will cross the synaptic cleft and bond with postsynaptic receptors.

Ans: D

**Feedback:**

In chemical synapses, neurotransmitters cross the synaptic cleft and bond with postsynaptic receptors to facilitate communication between neurons. This communication is one way, not two way, and each neuron has synaptic connections with thousands of other neurons. Gap junctions are associated with electrical synapses, not chemical synapses.

6. The neurotransmitter GABA mainly functions to trigger inhibitory postsynaptic potentials (IPSPs). Therefore, when explaining this to a group of nursing students, the nurse will state that
- A) it takes at least three chemical substances (amino acids, neuropeptides, and monoamines) to stimulate any activity between the cells.
  - B) there is a symbiotic relationship; therefore, the end result will be depolarization of the postsynaptic membrane.
  - C) the combination of GABA with a receptor site is inhibitory since it causes the local nerve membrane to become hyperpolarized and less excitable.
  - D) the neurotransmitters will interact with cholinergic receptors to bind to acetylcholine in order to produce hypopolarization within the cell.

Ans: C

**Feedback:**

A neurotransmitter can cause an excitatory or an inhibitory graded potential. The combination of a transmitter with a receptor site is inhibitory in the sense that it causes the local nerve membrane to become hyperpolarized and less excitable. This is called inhibitory postsynaptic potential (IPSP).

7. When reviewing the purpose/action of neurotransmitters as they interact with different receptors, the nursing instructor gives an example using acetylcholine. When acetylcholine is released at the sinoatrial node in the right atrium of the heart, it is
- A) positively charged.
  - B) inhibitory.
  - C) overstimulated.
  - D) dormant.

Ans: B

**Feedback:**

The action of a transmitter is determined by the type of receptor to which it binds. Acetylcholine is excitatory when it is released at a myoneural junction, and it is inhibitory when it is released at the sinoatrial node in the heart.

8. A male newborn infant has been diagnosed with spina bifida occulta. Which of the following pathophysiological processes has most likely contributed to the infant's health problem?
- A) The neural groove failed to fuse and completely close across the top of the neural plate.
  - B) The infant's spinal cord and meninges protrude through his skin.
  - C) The child's central and peripheral nervous systems have insufficiently differentiated during embryonic development.
  - D) The infant's soma and viscera are underdeveloped.

Ans: A

**Feedback:**

Spina bifida occulta is characterized by incomplete closure of the axial groove around the ectodermal tube (neural tube). Protrusion of the spinal cord and meninges through the skin is associated with meningocele. Insufficient development of the CNS, PNS, soma, or viscera is not considered a central characteristic of spina bifida occulta.



9. A child is experiencing difficulty with chewing and swallowing. The nurse knows that which of the following cells may be innervating specialized gut-related receptors that provide taste and smell?

A) Special somatic afferent fibers  
B) General somatic afferents  
C) Special visceral afferent cells  
D) General visceral afferent neurons

Ans: C

**Feedback:**

Special visceral afferent cells innervate specialized gut-related receptors. Their central processes communicate with special VIA column neurons that project to reflex circuits producing salivation, chewing, swallowing, and other responses. Special somatic afferent fibers are concerned with joint and tendon sensation. General somatic afferents respond to stimuli that produce pressure or pain. General visceral afferent neurons innervate visceral structures such as the GI tract, urinary bladder, and the heart and great vessels.

10. A nursing student having trouble moving his head from side to side is likely experiencing a problem with which type of neurons?

A) General visceral efferent neurons  
B) Preganglionic neurons  
C) Parasympathetic postganglionic neurons  
D) Pharyngeal efferent neurons

Ans: D

**Feedback:**

Pharyngeal efferent neurons innervate brachial arch skeletal muscles, muscles of mastication and facial expression, and muscles of the pharynx and larynx. They also innervate muscles responsible for moving the head. General visceral efferent neurons and preganglionic neurons (same) innervate smooth and cardiac muscle and glandular cells of the body, most of which are in the viscera. Parasympathetic postganglionic neurons have no effect in moving the head.

11. Following a spinal cord injury suffered in a motor vehicle accident, a 22-year-old male has lost fine motor function of his fingers and thumb but is still able to perform gross motor movements of his hand and arm. Which of the following components of his white matter has most likely been damaged?

A) The inner layer (archilayer)  
B) The middle layer (paleolayer)  
C) The outer layer (neolayer)  
D) The reticular formation

Ans: C

**Feedback:**

Fine manipulation skills are the domain of the outer layer, or neolayer, of the tract systems. The inner and middle layers and the reticular formation are not noted to be responsible for these functions.

12. Not realizing that its surface was hot, a woman has quickly withdrawn her hand from the surface of a bowl that she was removing from a microwave. Which of the following phenomena has facilitated the rapid movement of her hand in response to the painful stimulus?

A) Her midbrain has rapidly responded to the nociceptive stimuli and induced arm flexion.  
B) The withdrawal reflex of her peripheral nervous system has quickly mediated between afferent and effector neurons.  
C) The forebrain has mediated a protective spinal cord reflex.  
D) Her CNS has enacted a protective response received by neurons that innervate her arm muscles.

Ans: D

**Feedback:**

A reflex is a CNS-mediated response to a painful stimulus that involves an afferent neuron and an effector neuron. The midbrain and forebrain do not necessarily participate in the sensory or motor components of the response.

13. A Tae Kwon Do (TKD) master is applying downward pressure just above the elbow joint on an attacker who immediately collapses to the ground. The TKD master knows the elbow joint can bend inward toward the body but not in the opposite direction. Which of the following reflexes is applicable to this example?

A) Knife-clasp  
B) Withdrawal  
C) Myotatic  
D) Inverse myotatic

Ans: D

**Feedback:**

The inverse myotatic reflex is demonstrated in this example; when too much pressure is applied to the arm and tension reaches a certain level, the Golgi tendon “relaxes.” Since the arm bar is being held, the only way the body can “reflex” is by going down toward the ground, making the attacker fall downward. In persons with spastic paralysis, the inverse myotatic reflex becomes hyperactive and produces what is called the clasp-knife reaction. The withdrawal reflex is stimulated by a damaging (nociceptive) stimulus and quickly moves the body part away from the offending stimulus, usually by flexing a limb part. The myotatic or stretch reflex controls muscle tone and helps maintain posture.

14. During a clinical assessment of a 68-year-old client who has suffered a head injury, a neurologist suspects that a client has a sustained damage to her vagus (CN X) nerve. Which of the following assessment findings is most likely to lead the physician to this conclusion?

A) The client has difficulty swallowing and has had recent constipation and hypoactive bowel sounds.  
B) The client is unable to turn her head from side to side, and her tongue is flaccid.  
C) The client has a unilateral facial droop, dry eyes, and decreased salivary production.  
D) The client is unable to perform any fine motor movements of her tongue.

Ans: A

**Feedback:**

Dysphagia and impaired GI motility are associated with damage to the vagus nerve. Lateral movement of the head is mediated by CN XI. Facial droop and dry eyes are associated with CN VII, the facial nerve, while abnormal tongue movement is a result of damage to CN XII, the hypoglossal nerve.

15. A 9-year-old girl has a diffuse collection of symptoms that are indicative of deficits in endocrine and autonomic nervous system control. She also suffers from persistent fluid and electrolyte imbalances. The nurse knows which of the following aspects of the nervous system listed below would her health care providers focus their diagnostic efforts on?

- A) Her afferent and efferent cranial nerve function
- B) Possible damage to her pons and medulla
- C) Impaired function of her hypothalamus
- D) Potential damage to the girl's cerebellum

Ans: C

**Feedback:**

The hypothalamus plays a central role in the maintenance of fluid and electrolyte balance and in the maintenance of endocrine control. Various cranial nerves, the hindbrain, and the cerebellum would be less likely to be implicated.

16. A badly burned firefighter has been in an induced coma for 3 weeks. When he awakens, he thanks his son for singing *Happy Birthday* to him a week earlier. Which part of the brain is responsible for allowing him to hear and comprehend while comatose?

- A) Thalamus
- B) Hypothalamus
- C) Corpus callosum
- D) Basal ganglia

Ans: A

**Feedback:**

Coordination and integration of peripheral sensory stimuli occur in the thalamus, along with some crude interpretation of highly emotion-laden auditory experiences that not only occur but also can be remembered. For example, a person can recover from a deep coma in which cerebral cortex activity is minimal and remember some of what was said at the bedside. Inferior to the thalamus, and representing the ventral horn portion of the diencephalon, is the hypothalamus; it is the area of master-level integration of homeostatic control of the body's internal environment. The corpus callosum is a massive commissure, or bridge, of myelinated axons that connects the cerebral cortex of the two sides of the brain. The basal ganglia lie on either side of the internal capsule, just lateral to the thalamus; they supply axial and proximal unlearned and learned postures and movements, which enhance and add gracefulness to UMN-controlled manipulative movements.

17. Which of the following statements best conveys an aspect of the role of cerebrospinal fluid (CSF)?
- A) It provides physical protection for the brain and ensures that leukocytes and erythrocytes are evenly distributed in the CNS.
  - B) CSF cushions the brain and provides a near-water medium for diffusion of nutrients.
  - C) CSF distributes plasma proteins throughout the superficial gray matter of the CNS.
  - D) It ensures that the high metabolic and oxygenation needs of the brain are met, as well as absorbing physical shocks.

Ans: B

**Feedback:**

In addition to providing a cushion for the CNS, CSF provides a medium that is 99% water in which nutrients, electrolytes, and wastes can be diffused. It is not centrally involved in the distribution of oxygen, plasma proteins, or blood cells.

18. A 21-year-old male is brought to the ED following a night of partying in his fraternity. His friends found him “asleep” and could not get him to respond. They cannot recall how many alcoholic beverages he drank the night before. While educating a student nurse and the roommates in the fraternity, the nurse begins by explaining that alcohol is
- A) water-soluble compound that is easily absorbed by the gastric lining of the stomach.
  - B) very lipid soluble and rapidly crosses the blood–brain barrier.
  - C) able to reverse the transport of some substances to remove them from the brain.
  - D) very likely to cause sedation, and therefore the patient just needs to sleep it off.

Ans: B

**Feedback:**

The blood–brain barrier prevents many drugs from entering the brain. Most highly water-soluble compounds are excluded from the brain. Many lipid-soluble molecules cross the lipid layers of the blood–brain barrier with ease. Alcohol, nicotine, and heroin are very lipid soluble and rapidly enter the brain. Alcohol toxicity can kill patients, especially if they are not used to consuming beverages. These patients should never be left alone to “sleep it off.”

19. A 45-year-old diabetic male is experiencing erectile dysfunction. If his erectile dysfunction is caused by the nervous system, then the nurse can educate the patient that the venous blood supply to the penis is controlled by
- A) sacral parasympathetic fibers.
  - B) the hypothalamus.
  - C) the vagus nerve.
  - D) postganglionic sympathetic neurons.

Ans: A

**Feedback:**

The pelvic nerves leave the sacral plexus on each side of the cord and distribute their peripheral fibers to the bladder, uterus, urethra, prostate, distal portion of the transverse colon, descending colon, and rectum. Sacral parasympathetic fibers also supply the venous outflow from the external genitalia to facilitate erectile function. The hypothalamus, vagus nerve, and postganglionic sympathetic neurons do not control erectile function.

20. As you are walking in the park, a huge black Labrador (dog) runs up to you and places his paws on your shoulders. Immediately your heart starts racing, you feel palpitations and anxiety, and your hands become a little shaky. The nurse knows that this response is primarily caused by
- A) fear of dogs that make you feel like your chest is being tightened and that you have lost control of the situation.
  - B) increased levels of glucocorticoids by the adrenal glands that result in an increase in epinephrine level.
  - C) response of the cholinergic muscarinic receptors on innervational targets of postganglionic fibers.
  - D) stimulation of the release of  $\beta_2$ -adrenergic receptors, which will open the airway and increase oxygenation.

Ans: B

**Feedback:**

Any situation sufficiently stressful to evoke increased levels of glucocorticoids also increases epinephrine levels. Increased epinephrine levels results in tachycardia, palpitations, anxiety, and tremors. Cholinergic muscarinic receptors and  $\beta$  blockers do not help in times of immediate stress.

## Chapter 14- Somatosensory Function, Pain, and Headache

1. While batting, a baseball player is struck in the ribs by a pitch. Place the following components of the player's pain pathway in the chronological order as they contribute to the player's sensation of pain. Use all the options.

- A) Thalamus
- B) Dorsal root ganglion body
- C) Dorsal root ganglion periphery
- D) Axon
- E) Cerebral cortex

Ans: C, B, D, A, E

**Feedback:**

All somatosensory information from the limbs and trunk shares a common class of sensory neurons called *dorsal root ganglion neurons*. Somatosensory information from the face and cranial structures is transmitted by the trigeminal sensory neurons, which function in the same manner as the dorsal root ganglion neurons. The cell body of the dorsal root ganglion neuron, its peripheral branch (which innervates a small area of periphery), and its central axon (which projects to the CNS) communicate with the thalamus, which in turn communicates with the cerebral cortex using third-order neurons.

2. A student is feeling inside her backpack to find her mobile phone. There are a number of other items in the bag other than the phone. The nurse knows that which of the following terms best describes one's ability to sense of shape and size of an object in the absence of visualization?

- A) Stereognosis
- B) Astereognosis
- C) Modalities
- D) Somesthesia

Ans: A

**Feedback:**

The sense of shape and size of an object in the absence of visualization is known as stereognosis. Astereognosis is a deficit whereby a person can correctly describe the object but does not recognize it. "Modalities" is a term used for qualitative, subjective distinctions between sensations such as touch, heat, and pain. Somesthesia describes most of the perceptive aspects of body sensation and requires the function of the parietal association cortex.

3. A woman with severe visual and auditory deficits is able to identify individuals by running her fingers lightly over their face. Which of the following sources is most likely to provide the input that allows for the woman's unique ability?
- A) Pacinian corpuscles
  - B) Ruffini end organs
  - C) Meissner corpuscles
  - D) Free nerve endings

Ans: C

**Feedback:**

Meissner corpuscles, which are present on the hair-free areas like palms and fingers, are responsible for fine tactile sensation. Pacinian corpuscles provide input on vibration, while Ruffini end organs exist in deeper structures that signal continuous states of deformation. Free nerve endings also detect touch and pressure, but not to the highly differentiated degree of Meissner corpuscles.

4. A mother is placing her child into the bathtub. The child immediately jumps out of the tub and begins to cry, stating his feet are "burning." The nurse in the emergency department knows that the child's response is based on which of the following pathophysiological principles listed below?
- A) Children react much quicker to contact with hot water than adults.
  - B) The tactile sensation occurs well in advance of the burning sensation. The local withdrawal reflex reacts first.
  - C) It takes a long time for thermal signals to be processed before the brain can send a signal through the spinal cord and tell the foot to withdraw.
  - D) The thermal processing center is located on the rapid conducting anterolateral system on the same side of the brain as the injury.

Ans: B

**Feedback:**

If a person places a foot in a tub of hot water, the tactile sensation occurs well in advance of the burning sensation. The foot has been removed from the hot water by the local withdrawal reflex well before the excessive heat is perceived by the forebrain. All other responses are incorrect.



5. If the patient's dorsal columns are not functioning, the nurse will observe which of the following responses during neurotesting, where the nurse asks the patient to close his eyes and then proceeds to touch corresponding parts of the body on each side simultaneously with two sharp points?

A) Grimacing when body touched with sharp points  
B) No response to two-point discrimination  
C) Heightened proprioceptive response  
D) Inability to identify which way his finger was moved during the test

Ans: B

**Feedback:**

When comparing the discriminative dorsal column–medial lemniscus pathway with anterolateral tactile pathways with testing (with eyes closed), gently brush the skin with cotton, touch an area with one or two sharp points, touch corresponding parts of the body on each side simultaneously or in random sequence, and passively bend the person's finger one way and then another. If dorsal columns are not functioning, the tactile threshold two-point discrimination and proprioception are missing, and the person has difficulty discriminating which side of the body received stimulation.

6. Match the pain theory to the correct physiologic basis for the pain.

A. Specificity theory	1. Light touch applied to the skin would produce the sensation of touch through low-frequency firing of the receptor.
B. Pattern theory	2. Repeated sweeping of a soft-bristled brush on the skin over or near a painful area may result in pain reduction for several minutes.
C. Gate control theory	3. Proposes that the brain contains a widely distributed neural network that contains somatosensory, limbic, and thalamocortical components.
D. Neuromatrix theory	4. Describes how an acute injury is predicted to be but does not take into account the person's feelings of how the pain feels to him or her.

Ans: A–4, B–1, C–2, D–3

**Feedback:**

Specificity theory—describes how an acute injury is predicted to be but does not take into account the person's feelings of how the pain feels to him or her; pattern theory—light touch applied to the skin would produce the sensation of touch through low-frequency firing of the receptor; gate control theory—repeated sweeping of a soft-bristled brush on the skin over or near a painful area may result in pain reduction for several minutes; neuromatrix theory—proposes that the brain contains a widely distributed neural network that contains somatosensory, limbic, and thalamocortical components.

7. Following a knee injury, a football player is taking ibuprofen, a nonsteroidal anti-inflammatory drug, for the control of pain. Which of the following drug actions is most likely to result in diminished sensation of pain for the player?
- A) The drug inhibits communication by third-order neurons between the thalamus and cerebral cortex.
  - B) The drug inhibits the enzyme needed for prostaglandin synthesis.
  - C) The drug changes the postexcitatory potential in C fibers, leading to pain sensitization.
  - D) The drug slows the conduction velocity of myelinated A $\delta$  fibers in the pain pathway.

Ans: B

**Feedback:**

Analgesia can be achieved by inhibition of prostaglandin synthesis, as in the case of many NSAIDs. These drugs do not affect the function of third-order neurons, the action potential of C fibers, or the conduction velocity of A $\delta$  fibers.

8. A 60-year-old male client with a long history of back pain has had little success with a variety of analgesic regimens that his family physician has prescribed. He has recently been diagnosed with a chronic pain disorder. Which of the following teaching points about chronic pain would his physician most likely emphasize to the client?
- A) "If your pain comes and goes, then we won't characterize it as chronic, and it will require different treatment."
  - B) "You need to remind yourself that this is a purely physical phenomenon that requires physical treatment."
  - C) "Our challenge is to bring you relief but still treat the underlying back problem that your body is telling you about."
  - D) "These pain signals your body is sending likely serve no real, useful, or protective function."

Ans: D

**Feedback:**

A hallmark of chronic pain is that it usually does not serve any useful function, and that it is often remote from, or even irrelevant to, the originating cause. Like all pains, chronic pain is a complex and multifaceted phenomenon that supersedes purely physical considerations. Chronic pain need not be continuous and unchanging to be characterized as chronic.

9. A client in an acute medicine unit of a hospital with a diagnosis of small bowel obstruction is complaining of intense, diffuse pain in her abdomen. Which of the following physiological phenomena is most likely contributing to her complaint?
- A) Nociceptive afferents are conducting the sensation of pain along the cranial and spinal nerve pathways of the ANS.
  - B) First-order neurons are inappropriately signaling pain to the dorsal root ganglion.
  - C) The client is experiencing neuropathic pain.
  - D) The client's C fibers are conducting pain in the absence of damaged A $\delta$  fibers.

Ans: A

**Feedback:**

Visceral pain, as characterized by the client's description of her pain, is conducted by way of nociceptive afferents that use the cranial and spinal nerve pathways of the ANS. The problem is not likely rooted in the inappropriate firing of first-order neurons or the substitution of conduction by C fibers. Pain that is attributable to a pathological process apart from the neural pain network is not normally considered to be neuropathic.

10. A nurse on a postsurgical unit is providing care for a 76-year-old female client who is 2 days posthemiarthroplasty (hip replacement) and who states that her pain has been out of control for the last several hours, though she is not exhibiting signs of pain. Which of the following guidelines should the nurse use for short-term and long-term treatment of the client's pain?
- A) Reconciling the client's need for opioid analgesics with the risk of addiction to these drugs
  - B) Recognizing the client's pain is not likely self-limiting
  - C) Knowing that the client's self-report of pain is the most reliable indicator of pain
  - D) Realizing that chronic pain is likely to require innovative and complex treatment

Ans: C

**Feedback:**

Clinically, the patient's self-report of pain is the most reliable indicator of pain. The risk of addiction to opioids is extremely low, and since the client's pain is acute rather than chronic, it is likely self-limiting.

11. A female client with bone metastases secondary to lung cancer is admitted for palliative radiation treatment and pain control. The client is presently experiencing pain that she rates at 9 out of 10. Which of the following nonpharmacological treatments is most likely to be a useful and appropriate supplement to pharmacological analgesia at this point?

- A) Teaching the client guided imagery and meditation
- B) Initiating neurostimulation
- C) Heat therapy
- D) Relaxation and distraction

Ans: D

**Feedback:**

Given the client's high pain rating, initiating teaching around imagery and meditation is unlikely to be effective or appropriate. Neurostimulation requires implantation and/or placement of internal components, while heat is more likely to address superficial pain or pain caused by muscle tension. Relaxation and distraction would be plausible treatment options for this client.

12. A 30-year-old female has suffered a third-degree burn to her hand after spilling hot oil on it in a kitchen accident. Which of the following teaching points by a member of her care team is most appropriate?

- A) "Tell us as soon as you sense the beginnings of a round of pain, and we will start with analgesics."
- B) "Opioids like morphine often cause constipation, but if this happens to you, we will discontinue opioids and change to another family of medications."
- C) "Opioids aren't without side effects, but we will take action to manage these side effects, so you can continue getting these drugs."
- D) "It's imperative that we prevent you from developing a tolerance for opioids while you're getting treatment for your burn."

Ans: C

**Feedback:**

While opioids carry side effects such as constipation, these can be managed in order to continue treatment; constipation would not preclude the continued use of opioids, but would require management. Pain medications should precede the onset of pain, and tolerance is not grounds for discontinuing treatment.

13. Which of the following would be an example of a child born with congenital insensitivity to pain? A child who
- A) develops pins-and-needles sensation after jumping out of a tree.
  - B) fell off a skate board and fractured ankle but did not feel any pain and just noted swelling in foot.
  - C) skinned knee from a bike accident but only told parents when it started burning.
  - D) cries every time the wind blows because it hurts his face and ears.

Ans: B

**Feedback:**

Analgesia is the absence of pain on noxious stimulation or the relief of pain without loss of consciousness. Congenital insensitivity is when the peripheral nerve defect apparently exists such that the transmission of painful nerve impulses does not result in perception of pain. Pins-and-needles sensation is called paresthesia. Burning sensations are usually associated with temperature (hyperthermia). Pain associated with wind (or any nonnoxious stimuli) is called allodynia.

14. Which of the following hospital patients is most likely to be diagnosed with complex regional pain syndrome II (CRPS II)?
- A) A man who has been admitted for treatment of continuing hyperalgesia after sustaining a nerve injury in a motor vehicle accident
  - B) A woman who requires analgesia more than 3 months after an episode of shingles
  - C) A male client with diabetes mellitus who requires analgesia prior to each dressing change on his chronic foot wound
  - D) A female who has seemingly unprovoked attacks of pain that are accompanied by facial tics and spasms

Ans: A

**Feedback:**

CRPS is marked by the presence of continuing pain, allodynia, or hyperalgesia after a nerve injury, not necessarily limited to the distribution of the injured nerve with evidence at some time of edema, changes in skin blood flow, or abnormal sensorimotor activity in the region of pain. Pain related to shingles is an example of postherpetic neuralgia, while a need for analgesia prior to dressing changes would not indicate CRPS. Sudden attacks of pain accompanied by facial tics and spasms may be indicative of trigeminal neuralgia.

15. A 58-year-old woman comes to the clinic for evaluation of a sharp, intermittent, severe, stabbing facial pain that she describes as, "like an electric shock." The pain occurs only on one side of her face; it seems to be triggered when she chews, brushes her teeth, or sometimes when she merely touches her face. There is no numbness associated with the pain. What is most likely causing her pain?

A) Postherpetic neuralgia  
B) Migraine headache  
C) Complex regional pain syndrome  
D) Trigeminal neuralgia

Ans: D

**Feedback:**

Her symptoms are characteristic of trigeminal neuralgia, caused by damage to the fifth cranial nerve, which carries impulses of touch, pain, pressure, and temperature to the brain from the face and jaw.

16. A patient with diabetes mellitus has just undergone a right, below-the-knee amputation following gangrene infection. A few days post-op, the patient confides in the nurse that he still feels his right foot. Knowing the pathophysiologic principles behind this, the nurse can

A) administer a psychotropic medication to help the patient cope with the loss of his leg.  
B) explain that many amputees have this sensation and that one theory surmises that the end of a regenerating nerve becomes trapped in the scar tissue of the amputation site.  
C) call the physician and ask him for an order for a psychological consult.  
D) educate the patient that this area has an usually abnormal increase in sensitivity to sensation but that it will go away with time.

Ans: B

**Feedback:**

Multiple theories exist related to the causes of phantom limb pain. One rationale is that the end of the regenerating nerve becomes trapped in the scar tissue that forms a barrier to regenerating outgrowth of the axon. The usual treatment includes the use of sympathetic blocks; TENS of the large myelinated afferents innervating the area; hypnosis; and relaxation training.

17. A nurse practitioner is assessing a 7-year-old boy who has been brought to the clinic by his mother, who is concerned about her son's increasingly frequent, severe headaches. Which of the nurse's following questions is least likely to yield data that will allow for a confirmation or ruling out of migraines as the cause of his problem?
- A) "Does your son have a family history of migraines?"
  - B) "When your son has a headache, does he ever have nausea and vomiting as well?"
  - C) "Does your son have any food allergies that have been identified?"
  - D) "Is your son generally pain free during the intervals between headaches?"

Ans: C

**Feedback:**

While food may trigger migraines in some individuals, food allergies are not an identified contributor to migraines, and their presence or absence would be unlikely to provide a differential diagnosis of migraine. Migraines have a strong genetic component and, in children, nausea and vomiting during a headache are suggestive of migraine. Individuals who are prone to migraines are pain free in the times between episodes.

18. A 25-year-old woman who works as an air-traffic controller presents with facial pain and severe headache. She reports that she sometimes feels the pain in her neck or ear and that it is particularly bad during very busy times at the airport. What is the most likely diagnosis?
- A) Migraine headache
  - B) Cluster headache
  - C) Temporomandibular joint syndrome
  - D) Sinus headache

Ans: C

**Feedback:**

Temporomandibular joint syndrome causes pain that originates in the temporomandibular joint and is usually referred to the face, neck, or ear. Headache is also common. It is aggravated by jaw function and can be particularly severe in people under stress, especially if they grind their teeth.

19. A 7-year-old child had an emergency appendectomy during the night. When trying to assess his pain, the nurse should
- A) ask him to rate his pain on a scale of 0 to 10, with 0 = no pain and 10 = worse pain ever.
  - B) show him a scale with faces of actual children and have him point to the picture that best describes how he is feeling.
  - C) consider his pulse and BP readings to be the most specific indicators of the amount of pain he is experiencing.
  - D) try to distract him by blowing bubbles to minimize the use of opioids so that he does not become addicted to the narcotic.

Ans: B

**Feedback:**

Children do feel pain and have been shown to reliably and accurately report pain. With children 3 to 8 years of age, scales with faces of actual children or cartoon faces can be used to obtain a report of pain. Physiologic measures, such as heart rate, are convenient to measure, but they are nonspecific. They may be a sign of anxiety and not pain. Distraction methods are good, but medications should be used on an individual basis to match the analgesic agent with the level of pain.

20. Staff at the care facility note that a woman has started complaining of back pain in recent weeks and occasionally groans in pain. She has many comorbidities that require several prescription medications. The nurse knows that which of the following factors is likely to complicate the clinician's assessment and treatment of the client's pain?
- A) Neural pain pathways in the elderly differ from those in younger adults and are less responsive to treatment.
  - B) Assessment and treatment are possibly complicated by the large number of drugs that the client receives.
  - C) Accurate pain assessment is not possible in clients with significant cognitive deficits.
  - D) Frequent complaints of pain in older adults with dementia normally indicate hyperalgesia rather than an underlying physical problem.

Ans: B

**Feedback:**

Polypharmacy complicates both assessment and treatment of pain in the older adult. While minor changes in pain pathways do occur as an age-related change, these do not mean that treatment is unsuccessful. Pain assessment is more difficult in clients with cognitive deficits, but it is not impossible. Reports of pain in the elderly, as with any client, may signal an underlying health problem.



## Chapter 15- Disorders of Motor Function

1. During a late night study session, a pathophysiology student reaches out to turn the page of her textbook. Which of the following components of her nervous system contains the highest level of control of her arm and hand action?

A) Cerebellum  
B) Thalamus  
C) Basal ganglia  
D) Frontal lobe

Ans: D

**Feedback:**

While intentional movement involves input from various components of the nervous system including the cerebellum, thalamus, and basal ganglia, primary control and coordination are controlled by the motor cortex in the frontal lobe.

2. A patient is asked to stand with feet together, eyes open, and hands by the sides. Then the patient is asked to close his eyes while the nurse observes for a full minute. What assessment is the nurse performing?

A) Segmental reflex  
B) Posture  
C) Proprioception  
D) Crossed-extensor reflex

Ans: C

**Feedback:**

Information from the sensory afferents is relayed to the cerebellum and cerebral cortex and is experienced as proprioception or the sense of body movement and position independent of vision. The knee-jerk reflex is a form of stretch reflex. The crossed-extensor reflex serves to integrate motor movements, so they function in a coordinated manner.

3. A clinician is conducting an assessment of a male client suspected of having a disorder of motor function. Which of the following assessment findings would suggest a possible upper motor neuron (UMN) lesion?

A) The client has decreased deep tendon reflexes.  
B) The client displays increased muscle tone.  
C) The client's muscles appear atrophied.  
D) The client displays weakness in the distal portions of his limbs.

Ans: B

**Feedback:**

UMNs typically produce increased muscle tone, while hyporeflexia, muscle atrophy, and weakness in the distal portion of limbs are more commonly indicative of LMN lesions.

4. The parents of a 3-year-old boy have brought him to a pediatrician for assessment of the boy's late ambulation and frequent falls. Subsequent muscle biopsy has confirmed a diagnosis of Duchenne muscular dystrophy. Which of the following teaching points should the physician include when explaining the child's diagnosis to his parents?
- A) "Your son's muscular dystrophy is a result of faulty connections between muscles and the nerves that normally control them."
  - B) "He'll require intensive physical therapy as he grows up, and there's a good chance that he will outgrow this problem as he develops."
  - C) "Your son will be prone to heart problems and decreased lung function because of this."
  - D) "His muscles will weaken and will visibly decrease in size relative to his body size throughout his childhood."

Ans: C

**Feedback:**

Muscular dystrophy is associated with cardiac and respiratory complications. It does not involve the nervous system, and the problem will not dissipate with time. While muscles become weakened, pseudohypertrophy means that their size does not decrease.

5. The unique clinical presentation of a 3-month-old infant in the emergency department leads the care team to suspect botulism. Which of the following assessment questions posed to the parents is likely to be most useful in the differential diagnosis?
- A) "Have you ever given your child any honey or honey-containing products?"
  - B) "Is there any family history of neuromuscular diseases?"
  - C) "Has your baby ever been directly exposed to any chemical cleaning products?"
  - D) "Is there any mold in your home that you know of?"

Ans: A

**Feedback:**

Botulism in infants is frequently attributable to honey. Family history is not a relevant consideration given the bacterial etiology, and mold and chemical cleaning products are not known to predispose to botulism toxicity.

6. A 22-year-old female college student is shocked to receive a diagnosis of myasthenia gravis. What are the etiology and most likely treatment for her health problem?
- A) Autoimmune destruction of skeletal muscle cells; treatment with intensive physical therapy and anabolic steroids
  - B) A decline in functioning acetylcholine receptors; treatment with corticosteroids and intravenous immunoglobulins
  - C) Cerebellar lesions; surgical and immunosuppressive treatment
  - D) Excess acetylcholinesterase production; treatment with thymectomy

Ans: B

**Feedback:**

The etiology of myasthenia gravis involves a deficiency of acetylcholine receptors at neuromuscular junctions. Treatment can include corticosteroid therapy and intravenous immunoglobulins. Destruction of skeletal muscle cells, cerebellar lesions, and excess acetylcholinesterase are not noted to underlie the disease.

7. A toddler is displaying signs and symptoms of weakness and muscle atrophy. The pediatric neurologist suspects it may be a lower motor neuron disease called spinal muscular atrophy (SMA). The patient's family asks how he got this. The nurse will respond
- A) "This could result from playing in soil and then ingesting bacteria that are now attacking his motor neurons."
  - B) "No one really knows how this disease is formed. We just know that in time, he may grow out of it."
  - C) "This is a degenerative disorder that tends to be inherited as an autosomal recessive trait."
  - D) "This is a segmental demyelination disorder that affects all nerve roots and eventually all muscle groups as well."

Ans: C

**Feedback:**

SMA is a distinctive group of degenerative disorders involving LMNs that begins in childhood. Answer choice A relates to botulism. It is known which gene is involved in SMA. Answer choice D does not describe SMA.

8. Which of the following individuals is likely to have the best prognosis for recovery from his or her insult to the peripheral nervous system? An adult
- A) who developed rhabdomyolysis and ischemic injury after a tourniquet application.
  - B) who suffered a bone-depth laceration to the shoulder during a knife attack.
  - C) who had his forearm partially crushed by gears during an industrial accident.
  - D) who had nerves transected during surgery to remove a tumor from the mandible.

Ans: C

**Feedback:**

Crushing-type injuries carry a higher possibility of nerve function recovery than do lacerations and insults resulting from ischemia.

9. A nurse working in a busy orthopedic clinic is asked to perform the Tinel sign on a patient having problems in his hand/wrist. In order to test Tinel sign, the nurse should give the patient which of the following directions?
- A) "Stand tall, arms at your side, shut your eyes; place the tip of your index finger to your nose."
  - B) "Hold your wrist in complete flexion; keep it in this position for 60 seconds; how does your hand feel after placing it in a neutral position?"
  - C) "I'm going to tap (percuss) over the median nerve in your wrist; tell me what sensation you feel while I am doing this. Does the sensation stay in the wrist or go anywhere else?"
  - D) "I'm going to tap this tuning fork and place it on the side of your thumb; then tell me what you are feeling in your hand and wrist."

Ans: C

**Feedback:**

A positive Tinel sign will help diagnose carpal tunnel syndrome. The patient will have a tingling sensation radiating into the palm of the hand when lightly percussed over the median nerve at the wrist. Answer choice B relates to Phalen sign, which is also a test to help diagnose carpal tunnel syndrome. Answer choice D is not the medical test for carpal tunnel syndrome.

10. During a flu shot clinic, one of the questions the student nurse asks relates to whether the patient has had Guillain-Barré syndrome in his medical history. The patient asks, "What is that?" How should the nursing student reply?
- A) "A type of paralysis that affects movement on both sides of the body that may even involve the respiratory muscles"
  - B) "Swelling of your arm where you got your flu shot, and maybe your eyes and lips had some swelling as well"
  - C) "A degenerative disease where you have trouble walking without the help of a cane or walker"
  - D) "Influenza-like illness where you had fever and chills for 2 to 3 days after your last flu shot"

Ans: A

**Feedback:**

Guillain-Barré syndrome is an acute immune-mediated polyneuropathy. The majority of people report having had an acute, influenza-like illness before the onset of symptoms. It progresses along the ascending muscle weakness of the limbs, producing a symmetric flaccid paralysis. The rate of disease progression varies, and there may be disproportionate involvement of the upper or lower extremities. Option B is anaphylaxis following the flu shot. It is not a degenerative disease.

11. A 60-year-old male office worker presents to a clinic complaining of new onset of lower back pain that has been worsening over the last 6 weeks. The nurse knows which of the following components of his physical assessment and history is most indicative of a serious pathological process (like aortic aneurysm or cancer)?

- A) His pain is relieved by extended bed rest.
- B) When supine, passive rising of his leg to 90 degrees results in hamstring pain.
- C) He has needed regular nonsteroidal anti-inflammatory drugs to control the pain in recent weeks.
- D) His onset of pain has been gradual, and he has no prior history of lower back problems.

Ans: D

**Feedback:**

The gradual onset of back pain unrelated to injury and initial presentation after age 50 are considered red flags for more serious pathologies such as aortic aneurysm, malignancy, or compression fracture. Pain that is aggravated by lying down is a red flag for malignancy or infection. The onset of hamstring pain at 90 degrees of hip flexion is a normal finding. The need for and use of NSAIDs for lower back pain relief are not indicative of a serious pathology in and of itself.

12. A middle-aged woman is brought to the emergency room after a minor auto accident. Her gait is staggering and unsteady; her speech is slurred; and she displays slight nystagmus. The police officer who brought her in says she has not been drinking. Her blood pressure is very high. Which of the following health problems most likely underlies her present state?

- A) Multiple sclerosis
- B) Guillain-Barré syndrome
- C) Myasthenia crisis
- D) Cerebellar damage caused by a cerebrovascular accident

Ans: D

**Feedback:**

Cerebellar damage can resemble the effects of alcohol, because alcohol affects the cerebellum. This woman has not been drinking, but her high blood pressure puts her at risk for cerebrovascular accident.

13. A 70-year-old male has been diagnosed with a stroke that resulted in an infarct to his cerebellum. Which of the following clinical findings would be most closely associated with cerebellar insult?
- A) Flaccid loss of muscle tone
  - B) Difficulty in starting movement, stopping movement, and maintaining rhythmic movements.
  - C) Tremor, rigidity, and bradykinesia
  - D) Unsteady gait and difficulty in speaking and swallowing

Ans: D

**Feedback:**

An unsteady gait characterizes cerebellar ataxia, and both swallowing and speaking are partly the domain of the cerebellum. Flaccid loss of muscle tone is not noted to accompany cerebellar insult, and difficulties with starting movement, stopping movement, and maintaining rhythmic movements are indicative of basal ganglia disorders. Tremor, rigidity, and bradykinesia are associated with Parkinson disease.

14. The geriatrician providing care for a 74-year-old man with diagnosis of Parkinson disease has recently changed the client's medication regimen. What is the most likely focus of the pharmacologic treatment of the man's health problem?
- A) Maximizing acetylcholine release from synaptic vesicles at neuromuscular junctions
  - B) Preventing demyelination of the efferent cerebellar pathways
  - C) Increasing the functional ability of the underactive dopaminergic system
  - D) Preventing axonal degradation of motor neurons

Ans: C

**Feedback:**

Antiparkinson drugs act by increasing the functional ability of the underactive dopaminergic system. The cerebellar pathways, acetylcholine levels, and axonal degradation are not components of the etiology of Parkinson disease.

15. A 47-year-old woman was diagnosed with amyotrophic lateral sclerosis 3 years ago and has experienced a progressive onset and severity of complications. She has been admitted to a palliative care unit due to her poor prognosis? What assessments and interventions should the nursing staff of the unit prioritize in their care?

- A) Assessment and documentation of cognitive changes, including confusion and restlessness
- B) Regular pain assessment and administration of opioid analgesics as needed
- C) Assessment of swallowing ability and respiratory status
- D) Cardiac monitoring and administration of inotropic medications

Ans: C

**Feedback:**

The late stages of ALS normally involve deterioration in swallowing and speech and in the respiratory musculature. Cognitive changes are not common complications, and pain and cardiac complications are not noted to be paramount in the course of ALS.

16. A 41-year-old woman was diagnosed with multiple sclerosis (MS) 7 years ago and is sharing her story with members of an MS support group, many of whom have been diagnosed recently. Which of the following aspects of her health problem should the woman warn others to expect at some point in the progression of the disease? Select all that apply.

- A) Debilitating fatigue
- B) Progressive loss of visual acuity
- C) Gradual development of a resting tremor
- D) Loss of mental acuity
- E) Shuffling gait

Ans: A, B, D

**Feedback:**

Fatigue, visual deficits, and cognitive disturbances are all noted manifestations of MS, while respiratory function and GI function are not normally affected. Shuffling gait is usually associated with Parkinson disease.

17. The nurse should anticipate she will need to teach the newly diagnosed multiple sclerosis patient how to give injections if he is prescribed which medication to modify the course of the disease by reducing exacerbations?

A) Corticosteroids  
B) Plasmapheresis  
C) Interferon beta  
D) Mitoxantrone

Ans: C

**Feedback:**

Interferon beta helps modify the course of treatment of MS. It may also reduce exacerbations in persons with relapsing–remitting MS. It is a cytokine that acts as an immune enhancer. It is administered by injection. The other medications are prescribed for MS but not given by injection.

18. After being thrown off the back of a bull, the bull rider can move his arms but has loss of motor function in the lumbar and sacral segments of the spinal cord. This is usually referred to as

A) tetraplegia.  
B) quadriplegia.  
C) paraplegia.  
D) anterior cord syndrome.

Ans: C

**Feedback:**

Tetraplegia and quadriplegia are loss of motor or sensory function after damage to neural structures in the cervical segments of the spinal cord. Paraplegia refers to loss of motor or sensory function in thoracic, lumbar, or sacral segments. The arms function as normal. Anterior cord syndrome includes loss of motor function provided by the corticospinal tracts and loss of pain and temperature sensation from damage to the lateral spinothalamic tracts.



19. Several months ago, a 20-year-old male suffered a spinal cord injury brought about by a snowboard trick gone wrong. The lasting effects of his injury include a flaccid bowel and bladder and the inability to obtain an erection. While sensation has been completely preserved in his legs and feet, his motor function is significantly impaired. What type of incomplete spinal cord injury has the man most likely experienced?

A) Anterior cord syndrome  
B) Brown-Séquard syndrome  
C) Central cord syndrome  
D) Conus medullaris syndrome

Ans: D

**Feedback:**

Functional deficits resulting from conus medullaris syndrome usually result in flaccid bowel and bladder and altered sexual function. Sacral segments occasionally show preserved reflexes if only the conus is affected. Motor function in the legs and feet may be impaired without significant sensory impairment. Anterior cord syndrome and Brown-Séquard syndrome include a loss of pain and temperature sensation, while central cord syndrome manifests in spastic paralysis and is more common among older adults.

20. If the nurse suspects a spinal cord injury, the patient has developed autonomic dysreflexia. Which of the following assessments would confirm this complication? Select all that apply.

A) BP 180/98  
B) Skin covered with macular rash  
C) Pulse rate 49  
D) Complains of a pounding headache  
E) Cold, cyanotic lower legs

Ans: A, C, D

**Feedback:**

Autonomic dysreflexia represents an acute episode of exaggerated sympathetic reflex responses that occur in people with injuries at T6 and above, in which CNS control of spinal reflexes is lost. It is characterized by hypertension (BP 180/98), skin pallor, vagal slowing of the heart rate (pulse 49), and headache ranging from dull to severe and pounding.

## Chapter 16- Disorders of Brain Function

1. A nurse on a neurology unit is assessing a female brain-injured client. The client is unresponsive to speech, and her pupils are dilated and do not react to light. She is breathing regularly, but her respiratory rate is 45 breaths/minute. In response to a noxious stimulus, her arms and legs extend rigidly. What is her level of impairment?
  - A) Delirium
  - B) Coma
  - C) Brain death
  - D) Vegetative state

Ans: B

**Feedback:**

The continuum of loss of consciousness is marked by the degree of client's responsiveness to stimuli, in addition to the preservation of brain stem reflexes. Since this client still exhibits a pain response (the extended arms and legs indicate decerebrate posturing), even though her pupils are not responsive to light, she has sustained sufficient brain function that she fails to qualify as being brain dead or in a vegetative state.

2. Following a motor vehicle accident 3 months prior, a 20-year-old female who has been in a coma since her accident has now had her condition declared a persistent vegetative state. How can her care providers most accurately explain an aspect of her situation to her parents?
  - A) "Your daughter has lost all her cognitive functions as well as all her basic reflexes."
  - B) "Though she still goes through a cycle of sleeping and waking, her condition is unlikely to change."
  - C) "If you or the care team notices any spontaneous eye opening, then we will change our treatment plan."
  - D) "Your daughter's condition is an unfortunate combination with total loss of consciousness but continuation of all other normal brain functions."

Ans: B

**Feedback:**

A continuation of the sleep-wake cycle can exist in a persistent vegetative state. Reflexes often remain, as does spontaneous eye opening. Aspects of brain function beyond those governing consciousness are affected.

3. Which of the following individuals would most likely experience global ischemia to his or her brain?
- A) A male client who has just had an ischemic stroke confirmed by CT of his head
  - B) A woman who has been admitted to the emergency department with a suspected intracranial bleed
  - C) A man who has entered cardiogenic shock following a severe myocardial infarction
  - D) A woman who is being brought to hospital by ambulance following suspected carbon monoxide poisoning related to a faulty portable heater

Ans: C

**Feedback:**

Global ischemia is associated with a cessation of blood flow to the entire brain, as often occurs during cardiac arrest or myocardial infarction. Ischemic stroke and intracranial bleeding are likely to cause focal ischemia; carbon monoxide toxicity is associated with hypoxia.

4. Which of the following diagnostic findings is likely to result in the most serious brain insult?
- A) Mean arterial pressure (MAP) that equals intracranial pressure (ICP)
  - B) Moderate decrease in brain tissue volume secondary to a brain tumor removal
  - C) Increased ICP accompanied by hyperventilation
  - D) High intracellular concentration of glutamate

Ans: A

**Feedback:**

When the pressure in the cranial cavity approaches or exceeds the MAP, tissue perfusion becomes inadequate; cellular hypoxia results; and neuronal death may occur. Displacement of CSF and blood can partially compensate for decreased brain tissue volume. Hyperventilation partially mitigates, rather than exacerbates, increase in ICP. Glutamate is normally in far higher concentrations intracellularly than extracellularly.

5. Following a car accident of a male teenager who did not have his seatbelt on, he arrived in the emergency department with a traumatic brain injury. He has severe cerebral edema following emergent craniotomy. Throughout the night, the nurse has been monitoring and reporting changes in his assessment. Which of the following assessments correspond to a supratentorial herniation that has progressed to include midbrain involvement? Select all that apply.
- A) Clouding of consciousness
  - B) Decorticate posturing with painful stimulation
  - C) Pupils fixed at approximately 5 mm in diameter
  - D) Respiration rate of 40 breaths/minute
  - E) Decerebrate posturing following painful stimulation of the sternum

Ans: C, D, E

**Feedback:**

With midbrain involvement, pupils are fixed and midsized (5 mm in diameter), and reflex adduction of the eyes is impaired; pain elicits decerebrate posturing; and respirations change from Cheyne-Stokes respiration to neurogenic hyperventilation. Cloudiness of consciousness occurs in early diencephalic stages. Decorticate posturing with pain occurs in the diencephalic stage.

6. A patient in the intensive care unit who has a brain tumor has experienced a sharp decline. The care team suspects that water and protein have crossed the blood-brain barrier and been transferred from the vascular space into the client's interstitial space. Which of the following diagnoses best captures this pathophysiology?
- A) Focal hypoxia
  - B) Cytotoxic edema
  - C) Hydrocephalus
  - D) Vasogenic edema

Ans: D

**Feedback:**

Vasogenic edema occurs with conditions that impair the function of the blood-brain barrier and allow transfer of water and protein from the vascular into the interstitial space. It occurs in conditions such as tumors, prolonged ischemia, hemorrhage, brain injury, and infectious processes. Focal hypoxia is associated with localized delivery of blood with inadequate oxygen, and cytotoxic edema is an absolute increase in intracellular fluid. Hydrocephalus is an abnormal increase in CSF volume in any part or all of the ventricular system.

7. A baseball player was hit in the head with a bat during practice. In the emergency department, the physician tells the family that he has a “coup” injury. How will the nurse explain this to the family so they can understand?
- A) “It's like squeezing an orange so tight that the juice runs out of the top.”
  - B) “Your son has a huge laceration inside his brain where the bat hit his skull.”
  - C) “Your son has a contusion of the brain at the site where the bat hit his head.”
  - D) “When the bat hit his head, his neck jerked backward causing injury to the spine.”

Ans: C

**Feedback:**

A direct contusion of the brain at the site of external force is referred to as a coup injury. Contrecoup injury (answer choice D) is the rebound injury on the opposite side of the brain. Answer choice B relates to lacerations that are usually not caused by a direct blow to the head. However, depending on how hard the head was hit with a bat, a hematoma could form as the brain strikes the rough surface of the cranial vault.

8. Following an injury where a child hit his head from a fall, the CT scan reveals a contusion that the doctor classifies as a moderate brain injury. Which of the following manifestations will the nurse more than likely assess on this child that support this diagnosis? Select all that apply.
- A) Coma with total paralysis
  - B) Periods of unconsciousness
  - C) Aphasia at times
  - D) Nuchal rigidity
  - E) Weakness or slight paralysis affecting one side of the body

Ans: B, C, E

**Feedback:**

Moderate brain injury is characterized by a period of unconsciousness and may be associated with focal manifestations such as hemiparesis (weakness or slight paralysis affecting one side of the body), aphasia, and cranial nerve palsy. Coma with total paralysis is seen in severe brain injury. Nuchal rigidity is a classic sign of meningitis.

9. Following a collision while mountain biking, the diagnostic workup of a 22-year-old male has indicated the presence of an acute subdural hematoma. Which of the following pathophysiological processes most likely underlies his diagnosis?
- A) Blood has accumulated between the man's dura and subarachnoid space.
  - B) Vessels have burst between the client's skull and his dura.
  - C) A traumatic lesion in the frontal or temporal lobe has resulted in increased ICP.
  - D) Blood has displaced CSF in the ventricles as a consequence of his coup–contrecoup injury.

Ans: A

**Feedback:**

A subdural hematoma develops in the area between the dura and the arachnoid space, while epidural hematomas exist between the skull and dura. Intracerebral hematomas are located most often in the frontal or temporal lobe, and the ventricles are not directly involved in a subdural hematoma.

10. A 20-year-old has been admitted to a rehabilitation center after hospital treatment for an ischemic stroke. Which of the following aspects of the client's history would be considered to have contributed to his stroke? Select all that apply. The client
- A) is an African American male.
  - B) takes iron supplements for the treatment of chronic anemia.
  - C) blood pressure has historically been in the range of 150s/90s.
  - D) was diagnosed with type 2 diabetes 8 years ago.
  - E) takes corticosteroids for the treatment of rheumatoid arthritis.

Ans: A, C, D

**Feedback:**

African American race, male gender, hypertension, and diabetes are all well-documented risk factors for stroke. Anemia, autoimmune disorders like rheumatoid arthritis, and the use of corticosteroids are not noted to predispose to stroke.

11. A nurse at a long-term care facility provides care for an 85-year-old man who has had recent transient ischemic attacks (TIAs). Which of the following statements best identifies future complications associated with TIAs? TIAs
- A) are an accumulation of small deficits that may eventually equal the effects of a full CVA.
  - B) are a relatively benign sign that necessitates monitoring but not treatment.
  - C) resolve rapidly but may place the client at an increased risk for stroke.
  - D) are caused by small bleeds that can be a warning sign of an impending stroke.

Ans: C

**Feedback:**

TIAs can be considered a warning sign for future strokes. They are not hemorrhagic in nature, and their effects are not normally cumulative. They may require treatment medically or surgically.

12. Which of the following clients' signs and symptoms would allow a clinician to be most justified in ruling out stroke as a cause? An adult
- A) has had a gradual onset of weakness, headache, and visual disturbances over the last 2 days.
  - B) has experienced a sudden loss of balance and slurred speech.
  - C) has vomited and complained of a severe headache.
  - D) states that his left arm and leg are numb, and gait is consequently unsteady.

Ans: A

**Feedback:**

A cardinal trait of the manifestations of stroke is that the onset is sudden, and a gradual onset of symptoms over 2 days would suggest an alternative etiology. Ataxia, slurred speech, and unilateral numbness are associated with stroke, with sudden vomiting and headache being particularly indicative of a hemorrhagic CVA.

13. The nurse knows that which of the following treatment plans listed below is most likely to be prescribed after a computed tomography (CT) scan of the head reveals a new-onset aneurysmal subarachnoid hemorrhage?
- A) Stat administration of tissue plasminogen activator (tPA)
  - B) Administration of a diuretic such as mannitol to reduce cerebral edema and ICP
  - C) Monitoring in the ICU for signs and symptoms of cerebral insult
  - D) Craniotomy and clipping of the affected vessel

Ans: D

**Feedback:**

Surgery for treatment of aneurysmal subarachnoid hemorrhage involves craniotomy and inserting a specially designed silver clip that is tightened around the neck of the aneurysm. Administration of tPA would exacerbate bleeding, and a diuretic would not address the issue of bleeding. Monitoring alone would be an insufficient response given the severity of the problem.

14. A college student has been experiencing frequent headaches that he describes as throbbing and complaining of difficulty concentrating while studying. Upon cerebral angiography, he is found to have an arteriovenous malformation. Which of the following pathophysiological concepts is likely responsible for his symptoms?
- A) Increased tissue perfusion at the site of the malformation
  - B) Hydrocephalus and protein in the cerebral spinal fluid
  - C) High pressure and local hemorrhage of the venous system
  - D) Localized ischemia with areas of necrosis noted on CT angiography

Ans: C

**Feedback:**

In arteriovenous malformations, a tangle of arteries and veins acts as a bypass between the cerebral arterial and venous circulation, in place of the normal capillary bed. However, the capillaries are necessary to attenuate the high arterial blood pressure before this volume drains to the venous system. As a result, the venous channels experience high pressure, making them to hemorrhage and rupture more likely; the lack of perfusion of surrounding tissue causes neurologic deficits such as learning disorders. Headaches are severe, and people with the disorder may describe them as throbbing (synchronous with their heartbeat). Increased tissue perfusion means that more oxygenated blood is brought to the area, which is not the case. The elevated arterial and venous pressures divert blood away from the surrounding tissue, impairing tissue perfusion. Answer choice B is incorrect since arteriovenous malformation is associated with blood vessels and not the fluid within the ventricles of the brain. Answer choice D is incorrect in that there is blood flow to the area. Ischemia is associated with decreased arterial flow resulting in death to brain tissue.

15. A 9-year-old boy has been brought to the emergency department by his father who is concerned by his son's recent fever, stiff neck, pain, and nausea. Examination reveals a petechial rash. Which of the following assessment questions by the emergency room physician is most appropriate?
- A) "Is your son currently taking any medications?"
  - B) "Has your son had any sinus or ear infections in the last little while?"
  - C) "Does your son have a history of cancer?"
  - D) "Was your son born with any problems that affect his bone marrow or blood?"

Ans: B

**Feedback:**

The most common symptoms of acute bacterial meningitis are fever and chills; headache; stiff neck; back, abdominal, and extremity pains; and nausea and vomiting. Risk factors associated with contracting meningitis include otitis media and sinusitis or mastoiditis. Particular medications, a history of neoplasm, and hematopoietic problems would be unlikely to relate directly to his symptoms of meningitis.



16. A teenager, exposed to West Nile virus a few weeks ago while camping with friends, is admitted with headache, fever, and nuchal rigidity. The teenager is also displaying some lethargy and disorientation. The nurse knows which of the following medical diagnoses listed below may be associated with these clinical manifestations?

A) Rocky Mountain spotted fever  
B) Lyme disease  
C) Encephalitis  
D) Spinal infection

Ans: C

**Feedback:**

Encephalitis represents a generalized infection of the parenchyma of the brain or spinal cord. A virus, such as West Nile virus, usually causes encephalitis although it may be caused by bacteria, fungi, and other organisms. Encephalitis is characterized by fever, headache, and nuchal rigidity. However, more often, people also experience neurologic disturbances, such as lethargy, disorientation, seizures, focal paralysis, delirium, and coma. Rocky Mountain spotted fever (answer choice A) is a tick-borne disease caused by the bacterium *Rickettsia rickettsii* and usually begins with a sudden onset of fever and headache. A rash may occur 2 to 5 days after fever onset. Lyme disease (answer choice B) is also a tick-borne disease. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. As the disease progresses, the patient develops bouts of severe joint pain and swelling of the joint. Neurological problems may occur for weeks, months, or even years after the infection and may include inflammation of the membranes surrounding the brain (meningitis). Spinal infections (answer choice D) can be thought of as a spectrum of diseases comprising spondylitis, discitis, spondylodiscitis, pyogenic facet arthropathy, and meningitis.

17. A 20-year-old has been diagnosed with an astrocytic brain tumor located in the brain stem. Which of the following statements by the oncologist treating the client is most accurate?

A) "Your prognosis will depend on whether we can surgically resect your tumor."  
B) "Our treatment plan will depend on whether your tumor is malignant or benign."  
C) "This is likely a result of a combination of heredity and lifestyle."  
D) "The major risk that you face is metastases to your lungs, liver, or bones."

Ans: A

**Feedback:**

The prognosis of people with pilocytic astrocytomas is influenced primarily by their location. The prognosis is usually better for people with surgically resectable tumors, such as those located in the cerebellar cortex, than for people with less accessible tumors, such as those involving the hypothalamus or brain stem. Because of infiltration of brain tissue that prevents total resection, surgery rarely cures brain tumors. The binary of malignant and benign is not used to characterize brain tumors, and the etiology and substantive risk factors are largely unknown. Brain tumors rarely metastasize outside the CNS.

18. A brain tumor causing clinical manifestations of headache, nausea, projectile vomiting, and mental changes is likely located in which parts of the brain? Select all that apply.
- A) Intra-axially
  - B) Extra-axially
  - C) Brain stem
  - D) Temporal lobe
  - E) Frontal lobe

Ans: A, B, E

**Feedback:**

Tumors within the intracranial (intra-axially) cavity are fixed and cause s/s of increased ICP like headache, nausea, vomiting, mental changes, papilledema, visual disturbances, and alterations in sensory and motor function. Outside the brain tissue (extra-axially), but within the cranium, tumors may reach large sizes without producing s/s. After they reach a sufficient size, s/s of increased ICP appear. Temporal lobe tumors often produce seizures as their first symptom. Brain stem tumors commonly produce upper/lower motor neuron s/s such as weakness of facial muscles and ocular palsies. Frontal lobe tumors also grow to a large size and cause s/s of increased ICP.

19. Which of the following clients may be experiencing a sensory focal seizure that has sent an abnormal cortical discharge to the autonomic nervous system (ANS)?
- A) A 44-year old patient complaining of constant movement and pain in the legs that gets worse when he tries to sleep
  - B) An 85-year-old patient experiencing drooping of the right side of the face and numbness in the right arm and leg
  - C) A 56-year-old complaining of tingling sensations and has both an elevated pulse and BP
  - D) A 22-year-old complaining of a stiff neck and achiness, along with some nausea and vomiting

Ans: C

**Feedback:**

Sensory symptoms correlate with the location of seizure activity on the contralateral side of the brain and may involve somatic sensory disturbance (tingling). With abnormal cortical discharge stimulating ANS, tachycardia, diaphoresis, hypo- or hypertension, or papillary changes may be evident. Distracter A is associated with restless legs syndrome (RLS). Distracter B is associated with stroke (CVA). Distracter D is associated with meningitis.

20. A 26-year-old female is resting after a one-minute episode during which she lost consciousness while her muscles contracted and extremities extended. This was followed by rhythmic contraction and relaxation of her extremities. On regaining consciousness, she found herself to have been incontinent of urine. What has the woman most likely experienced?
- A) A myoclonic seizure
  - B) A tonic-clonic seizure
  - C) An absence seizure
  - D) A complex partial seizure

Ans: B

**Feedback:**

A tonic-clonic seizure often begins with tonic contraction of the muscles with extension of the extremities and immediate loss of consciousness. Incontinence of the bladder and bowel is common. Cyanosis may occur from contraction of airway and respiratory muscles. The tonic phase is followed by the clonic phase, which involves rhythmic bilateral contraction and relaxation of the extremities. A myoclonic seizure involves bilateral jerking of muscles, generalized or confined to the face, trunk, or one or more extremities. Absence seizures are nonconvulsive, and complex partial seizures are accompanied by automatisms.

## Chapter 17- Sleep and Sleep Disorders

1. Which of the following statements most accurately characterizes an aspect of the neurobiology of sleep?
  - A) The hypothalamus stimulates the anterior and posterior pituitary to modulate sleeping–waking cycles.
  - B) The pituitary releases melatonin at predictable points in the circadian rhythm in order to facilitate sleep.
  - C) The reticular formation, thalamus, and cerebral cortex interact to integrate the sleep–wake cycle.
  - D) Input from the retinas is interpreted by the cerebellum and contributes to maintenance of the circadian rhythm.

Ans: C

**Feedback:**

The sleep–wake cycle is rooted anatomically in the reticular formation and the interaction between the thalamus and cerebral cortex. Melatonin is produced by the pineal gland, and the hypothalamus and cerebellum are not central contributors to the sleep–wake cycle.

2. A client with a diagnosis of insomnia is surprised when his physician explains to him that his brain is still highly active during normal sleep. Which of the following statements best captures the character of brain activity during sleep?
  - A) “Fewer neurons in your brain are firing when you're asleep, but they're more synchronized than when you're awake.”
  - B) “While you're obviously less aware of stimuli when you're asleep, your brain is actually more active when you're asleep than when you're awake.”
  - C) “There are four types of brain activity, and actually all of them occur at different stages of sleep.”
  - D) “Your brain alternates between periods of activity and periods of inactivity when you're asleep, and these correspond to your eye movement.”

Ans: A

**Feedback:**

Brain activity during sleep is lessened but is more synchronous than during waking. The brain is not more active during sleep, and alpha and beta rhythms are not associated with sleep. The brain is never truly inactive during sleep.

3. Which of the following characteristics describe stage 2 non-REM sleep? Select all that apply.

- A) It occurs at the onset of sleep and lasts approximately 7 minutes.
- B) During this stage, theta waves are primarily seen on EEG.
- C) This stage is known as deep sleep where heart rate and BP are decreased.
- D) This stage has interruptions of spindle activity that helps with integration of new memories.
- E) Muscles of the body are relaxed.

Ans: B, D

**Feedback:**

Stage 2 non-REM sleep lasts approximately 10 to 25 minutes, where on EEG activity includes predominantly theta waves that are interrupted by sleep spindles consisting of bursts of high-frequency (12 to 14 Hz) waves. Answer choice A relates to stage 1 sleep that occurs at the onset of sleep and lasts approximately 7 minutes. Answer choices C and E relate to stages 3 and 4 of non-REM sleep, known as deep sleep where heart rate and BP are decreased and the muscles of the body are relaxed.

4. Which of the following observations of a female client in a sleep lab would indicate the clinicians that she is in REM sleep?

- A) Rolling eye movements are observed, and she has moderate muscle activity.
- B) Her motor movements are suppressed, and muscle tone is flaccid.
- C) Delta waves are evident on her EEG, and the heart and respiration rates are slowed.
- D) She has a low level of cerebral activity, and her EEG indicates low voltage and mixed frequencies.

Ans: B

**Feedback:**

REM sleep is accompanied by low levels of muscle movement and loss of muscle tone. Rolling eye movements, delta waves, and low levels of cerebral activity are associated with stages 1 through 4 of sleep.

5. The nurse knows that which of the following observations of a client during a sleep study would be most likely considered a pathological finding?
- A) The client experiences periods of apnea of 5 to 15 seconds in duration.
  - B) The client's intrinsic clock involves a sleep–wake cycle that is consistently 2 hours longer than the actual length of a day.
  - C) The client's  $PCO_2$  level is increased, and his  $PO_2$  level decreased during deep sleep.
  - D) The client spends the majority of his sleeping hours in deep REM sleep.

Ans: D

**Feedback:**

While vital, REM sleep does not normally occupy the majority of sleeping hours. The brain is highly active during REM sleep, and it accounts for 20% to 25% of normal sleep. Brief apneic spells are not uncommon, and the circadian rhythm often does not match the 24-hour length of day. It is normal for  $PCO_2$  to increase and  $PO_2$  to decrease during deep sleep.

6. Which of the following statements about over-the-counter (OTC) melatonin is accurate?
- A) It has received the FDA approval for effectiveness as a sleep aid.
  - B) Long-term studies of melatonin conclude that it is nonaddicting.
  - C) It produces phase-shifting changes in the circadian rhythm.
  - D) Under strict clinical testing, potency and purity of melatonin have been shown to be consistent.

Ans: C

**Feedback:**

Administration of melatonin produces phase-shifting changes in the circadian rhythm similar to those caused by light. Synthetic forms of melatonin are available without prescription in health food stores and pharmacies. However, synthetic forms of melatonin are not regulated by the FDA; therefore, their potency, purity, safety, and effectiveness cannot be ensured. There is a lack of clinical trial evidence about dosage, adverse effects, and drug interactions with over-the-counter forms of melatonin.

7. When explaining an upcoming test, a polysomnography, the nurse should include which of the following education related to equipment placements the patient will have placed on his or her person during the sleep study? Select all that apply.
- A) An ECG with lots of chest leads will monitor heart rate and rhythm.
  - B) A pulse oximeter placed on a finger is used to determine arterial oxygen saturation.
  - C) An EOG will be placed on the skin near the eye to record eye movements.
  - D) An EMG patch will be placed under the chin to record muscle movement.
  - E) An actigraph device will be placed on the wrists and ankles to measure body motion.

Ans: A, B, C, D

**Feedback:**

The ECG, which measures heart rate, is used to detect cardiac rhythm disorders, and the pulse oximeter is used to determine arterial oxygen saturation, which indicates adequacy of ventilation. The EOG, which records eye movements, and the EMG, which records muscle movement, will also be attached. During REM sleep, the eyes move rapidly, but the muscles are paralyzed. Periods during which the EOG recorded lots of movement, and the EMG recorded very little, would indicate REM sleep. An actigraph device will be placed on the wrists and ankles to measure body motion for obtaining objective measurements of sleep duration.

8. The parents of a 15-year-old boy are frustrated at his persistent inability to fall asleep at a reasonable hour at night, as well as the extreme difficulty that they have rousing him in the morning. While sleepy after waking, the son claims not to feel drowsy after lunch or in the evening. What is the most likely classification of the boy's sleep disorder?
- A) Delayed sleep phase syndrome (DSPS)
  - B) Non-24-hour sleep-wake syndrome
  - C) Advanced sleep phase syndrome (ASPS)
  - D) Chronic insomnia

Ans: A

**Feedback:**

The teen's sleep patterns are characteristic of DSPS. Non-24-hour sleep-wake syndrome is characterized by a sleep cycle that greatly exceeds 24 hours, and ASPS is the opposite of DSPS. Chronic insomnia would likely include afternoon and evening drowsiness.

9. A business traveler has just arrived in Japan from the United States. During a meeting with his customer, he begins to experience yawning and stretching with an inability to stay focused on the meeting. He also has some eye irritation and has developed a headache. Based on these clinical manifestations, what diagnosis would most likely be causing these symptoms?

A) Advanced sleep phase syndrome  
B) Delayed sleep phase syndrome  
C) Free-running sleep disorder  
D) Time zone change syndrome

Ans: D

**Feedback:**

All of the symptoms are manifestations of jet lag syndrome. Answer choice A relates to early sleep onset and early arising, where people have trouble staying awake in the evening. Answer choice B relates to difficulty in falling asleep at a conventional hour of night and awakening on time in the morning. Answer choice C relates to a lack of synchronization between the internal sleep-wake rhythm and the external 24-hour day, seen commonly in blind people.

10. Nurses regularly rotate between day shift hours and overnight work hours. Following an overnight shift, nurses frequently exhibit which of the following manifestations? Select all that apply.

A) Unable to sleep for a long period of time during the day  
B) Falling asleep while sitting in front of a computer charting during the night  
C) Finding it difficult to sleep when they have a night off  
D) Heightened alertness and reflexes on their drive home after work  
E) Increased hunger and thirst in the middle of the night

Ans: A, B, C

**Feedback:**

Manifestations of sleep disorders of night shift workers include shortened and interrupted daytime sleep after the night shift, somnolence and napping at work, sleepiness while commuting home, and insomnia on the nights off from work.



11. An adult client is experiencing chronic insomnia related to a recent divorce and child custody proceedings. The client is requesting a renewable prescription for “sleeping pills.” The nurse knows that which of the following interventions listed below will provide the most beneficial treatment for this client?

- A) Sedatives and hypnotic drugs will not provide safe relief of the client's health problem.
- B) The client is suffering from primary insomnia.
- C) Melatonin supplements will be the safest and most effective long-term pharmacological treatment.
- D) Behavioral therapies and education regarding sleep hygiene will provide assistance for the client.

Ans: D

**Feedback:**

Behavioral therapies may be beneficial in the treatment of insomnia. Sleep hygiene establishing a regular wake-up time to help set the circadian clock and regularity of sleep onset are encouraged. Drugs may be of use in the short term and should be used judiciously rather than completely avoiding them. The efficacy of melatonin is unproven, and his insomnia would likely be categorized as secondary insomnia, given the obvious contribution of stressors.

12. A 17-year-old female is suspected of having narcolepsy. Which of the following aspects of her medical history and sleep analysis would contribute to a confirmation of the diagnosis? Select all that apply.

- A) She repeatedly moves her large toe, ankle, and knee during sleep.
- B) She complains of a powerful urge to move her legs when in bed at night.
- C) She has frequently awakened unable to move or speak.
- D) She believes that she experiences auditory hallucinations when she awakens.
- E) Her sleep latency is normally around 1 hour.

Ans: C, D

**Feedback:**

Sleep paralysis and hypnopompic hallucinations are symptoms of narcolepsy. Repeated toe, ankle, and leg movements are associated with periodic limb movement disorder, while an urge to move her legs would suggest restless legs syndrome. Narcolepsy is not normally associated with long sleep latency periods.

13. While working for a neurologist who is assessing a patient experiencing restless legs syndrome (RLS), the nurse should be prepared to answer the question about why the patient needs to have his iron level drawn? The nurse response should include,
- A) "Many of the drugs we give for RLS can cause drastic decreases in your iron level."
  - B) "Many patients with RLS also have an iron deficiency anemia as well."
  - C) "You just look a little pale, and so we want to make sure you have normal blood levels."
  - D) "People with low iron levels do not have enough oxygen circulating to their legs."

Ans: B

**Feedback:**

RLS may be a symptom of iron deficiency, so the patient should undergo testing for serum ferritin and iron saturation levels. Iron deficiency is frequently present in the absence of anemia. Answer choice A is incorrect since one of the ways RLS is treated is by administering medication to correct the iron deficiency. Answer choice C is a common sign of anemia. Answer choice D is incorrect since the number of RBCs will decrease the oxygen carrying capacity to the body, not iron levels. Low iron levels can be caused by infection, cancer, chronic blood loss, or dietary deficiencies to name a few.

14. A 57-year-old female has presented to a clinic exasperated by the effect that restless legs syndrome is having on her sleep. The clinician has performed client teaching prior to choosing a treatment plan. Which of the following responses by the client demonstrates a sound understanding of her condition?
- A) "Increasing my calcium intake is something simple that might help."
  - B) "Transcutaneous electrical nerve stimulation might be a treatment that can help me avoid needing drugs for this."
  - C) "This could be something that I'm simply prone to genetically."
  - D) "I'll try to get more exercise, since there aren't really any effective medications for restless legs syndrome."

Ans: C

**Feedback:**

There is a strong suggestion of a genetic component to RLS. Calcium intake is not noted to influence RLS, and TENS is not a noted treatment modality. Pharmacologic treatments exist for the problem.

15. Which of the following individuals would be expected to have the highest risk of developing sleep apnea?
- A) A woman with restless legs syndrome and chronic obstructive pulmonary disease
  - B) A male client with a diagnosis of unstable angina and peripheral arterial disease
  - C) A man with poorly controlled diabetes and hypertension
  - D) A female with chronic insomnia and atrial fibrillation that is treated with warfarin

Ans: C

**Feedback:**

Male gender, diabetes, and hypertension are all associated with sleep apnea. COPD, angina, PAD, and atrial fibrillation are not noted to be strongly associated with sleep apnea.

16. Which of the following motor disorders of sleep can be life threatening?

- A) Narcolepsy
- B) Periodic limb movement disorder
- C) Obstructive apnea
- D) Restless legs syndrome

Ans: C

**Feedback:**

Obstructive apnea causes poor ventilation, poor-quality sleep, and daytime sleepiness, at best. At worst, it can contribute to depression, auto- and work-related accidents, cardiac dysrhythmias, and hypertension. Severe apnea can lead to pulmonary hypertension, polycythemia, or cor pulmonale. Periodic limb movement disorder and restless legs syndrome, although distressing and possibly indicative of a disease, are not of themselves life threatening. Narcolepsy is not a motor disorder of sleep.

17. A 77-year-old woman is concerned because she has occasionally found her husband sleepwalking in the last several weeks. What is her care provider's most appropriate response to her concerns?

- A) "This is not an uncommon event that often accompanies older age."
- B) "I'll likely prescribe a benzodiazepine for this when I next see your husband."
- C) "This is understandably upsetting for you, but as long as the environment is safe, it's likely not significant."
- D) "There may be something else going on with your husband such as delirium or a problem with his medications."

Ans: D

**Feedback:**

New-onset sleepwalking in the elderly is usually a manifestation of another problem such as delirium, drug toxicity, or a seizure disorder. It is not a normal age-related change, and a benzodiazepine is not a prudent initial treatment.

18. The nurse is educating the new mother about the sleep patterns of a newborn. Which of the following statements should she include in her education?
- A) "Newborns usually sleep approximately 16 to 20 hours/day."
  - B) "Newborns generally sleep 6 to 8 hours/day and then are awake for 2 to 4 hours."
  - C) "Don't worry about them sleeping too long; they will wake up when they are hungry."
  - D) "Most newborns will have their days and nights mixed up."

Ans: A

**Feedback:**

Newborns usually sleep approximately 16 to 20 hours/day. Equally distributed over night and daytime, sleep periods generally last for 1 to 4 hours interspersed with 1- to 2-hour periods of wakefulness. Initially, sleep-wake patterns are based on hunger.

19. A 5-year-old boy has starting sitting up in bed displaying signs of extreme anxiety. In the morning, when the parents ask the boy about this, he has no recollection. What should the nurse convey to the parents if this happens again?
- A) Assist the boy in settling down without awakening him after an episode.
  - B) Watch him closely to see if he has any twitching or thrashing about.
  - C) Bring him back to the clinic if this keeps happening, so we can prescribe some sleep medicine.
  - D) Shake him to wake him up, and then comfort him and put him back in bed.

Ans: A

**Feedback:**

Treatment for sleep terrors in children consists primarily of educating and reassuring the family. The child should be assisted in settling down without awakening. The child must be protected if he gets up and walks during these episodes.

20. A geriatrician is assessing an 84-year-old male recently admitted to a subacute medical unit of a hospital for rehabilitation following a recent fall resulting in a hip contusion. Which of the following aspects of the client's sleep history would the physician want to follow up with education? Select all that apply.

- A) "I make sure that I take a long nap each afternoon to compensate for my frequent waking at night."
- B) "I've got a bottle of diazepam at home, but I only take them once or twice a month."
- C) "I try my best to get out for a walk after breakfast or after supper."
- D) "I make it a rule not to drink any alcohol in the evening."
- E) "Once my head hits the pillow, I am fast asleep."

Ans: A, B

**Feedback:**

Daytime sleeping can interfere with the normal sleep–wake cycle. Diazepam is a long-acting benzodiazepine, and occasional use is acceptable. However, excessive use could lead to falls. Moderate exercise not performed before bedtime can help with insomnia. Alcohol can inhibit sleep in the elderly.

## Chapter 18- Disorders of Thought, Emotion, and Memory

1. Which of the following statements best captures the current understanding of the etiology of mental illness?
  - A) The role of “nurture,” experiences, and relationships has been largely disproven.
  - B) Mental illness can be attributed to organic brain changes and pathophysiological processes.
  - C) Mental illness exists from the interplay of biologic factors and psychosocial influences.
  - D) Current understanding of mental illness has shown that both biologic psychiatry and psychosocial psychiatry are incorrect.

Ans: C

**Feedback:**

Mental illness is currently thought to be the outcome of anatomical and/or physiological influences and psychosocial factors. Neither factor can attribute for 100% of the diagnoses and manifestations of mental illness. Both biologic psychiatry and psychosocial psychiatry have their merits and demerits; neither is wholly incorrect.

2. As part of a diagnostic workup of a 22-year-old male with recently diagnosed schizophrenia, a neurologist wants to examine the levels of metabolic activity in particular areas of the client's brain. Which of the following diagnostic procedures is the physician most likely to order?
  - A) Computed tomography (CT)
  - B) Electroencephalography (EEG)
  - C) Magnetic resonance imaging (MRI)
  - D) Positron emission tomography (PET)

Ans: D

**Feedback:**

PET is rooted in the selective brain uptake of radiolabeled isotopes. As such, it can measure brain metabolic activity. CT and MRI offer visualization of structural components, while EEG measures electrical activity.

3. An adult, who was sexually abused as a child, has been displaying some stress. She seems to complain of increasing medical problems when she is under more stress. The nurse would classify this as an example of
- A) vitamin deficiency.
  - B) the stress–diathesis theory.
  - C) mendelian research.
  - D) parental disassociation.

Ans: B

**Feedback:**

The stress–diathesis model of psychiatric disorders evolved from a recognition that genetics (diathesis) and environment (stress) both contribute to the development of psychiatric disorders. Adults who report significant traumatic experiences such as an emotional, physical, or sexual abuse as children show a graded positive response; that is, the more trauma experienced, the more both medical and mental illness occur later in life. Vitamin deficiency has not been implicated as a cause of increasing medical complaints when experiencing stress. Mendelian research studies genetics and describes the way in which genes modulate behavior and psychological traits. Parental nurturing mediates this epigenetic response, but in the absence of nurturing (dissociation), children have difficulties with attention and following directions. As teenagers, they are more likely to engage in high-risk behaviors and, as adults, show increased aggression, impulsive behavior, weakened cognition, and an inability to discriminate between real and imagined threats.

4. A toddler brought up in a chaotic, nonnurturing environment may suffer neurological consequences if the parent does not achieve attachment with the child. The nurse knows that which of the following nervous systems listed below is the first to respond to the safety needs of the child?
- A) Parasympathetic nervous system
  - B) Autonomic nervous system
  - C) Sympathetic nervous system
  - D) Limbic system

Ans: C

**Feedback:**

If the ventral vagus is utilized and fails to provide safety, the SNS is recruited first. The other distracters are not the first to respond.

5. A student notices that at certain times during his studying for final exams, he is more awake and his ability to think at a higher level is happening easier. The nurse knows that this experience may be attributed to which of the following neurological functions?
- A) Release of excitatory neurotransmitters such as glutamate
  - B) Release of GABA, an inhibitory neurotransmitter
  - C) Release of corticotrophin-releasing hormone
  - D) Heightened precortex processes

Ans: A

**Feedback:**

Excitatory neurotransmitters such as glutamate increase the probability that the target cell will fire an action potential by mediating the depolarization of the target cell.

Excitatory transmitters serve as the body's stimulants promoting wakefulness, energy, and activity through regulating many of the body's most basic functions, including thought processes, higher thinking, and sympathetic activity. Distracters B, C, and D do not play a role in this process.

6. Parents of a 16-year-old male who has been behaving in increasingly bizarre ways in recent months are distraught that he has been diagnosed with schizophrenia. Which of the mother's following statements about her son's diagnosis demonstrates an accurate understanding of the disease?
- A) "It's disturbing to know that what I did when I was pregnant and the way we raised him contributed to this."
  - B) "We are somewhat relieved that psychotherapy and a supportive environment will resolve most of the positive and negative symptoms."
  - C) "This makes us even more worried about his younger brother and whether he might develop schizophrenia."
  - D) "We're committed to lovingly but firmly convincing him that his delusions aren't based in reality."

Ans: C

**Feedback:**

The risk of developing schizophrenia is much higher in individuals with a first-degree relative who has the disease. Prenatal behavior and child-rearing techniques are not strongly linked with the development of schizophrenia, and therapy and support alone are not likely to eliminate symptoms. Delusions are not normally amenable to reason.



7. Which of the following is a negative symptom of schizophrenia?

- A) Hallucinations
- B) Incoherence
- C) Word salad
- D) Affective flattening

Ans: D

**Feedback:**

The negative symptoms of schizophrenia reflect the absence of normal social and interpersonal behaviors and include alogia (tendency to speak very little), avolition (lack of motivation for goal-oriented activity), apathy, affective flattening (lack of emotional expression), and anhedonia (an inability to experience pleasure in things that ordinarily are pleasurable). Positive symptoms are those that reflect the presence of abnormal behaviors and include disorganized, incomprehensible speech; delusions (*e.g.*, that one is being controlled by an outside force); hallucinations (hearing voices is the most common); and grossly disorganized or catatonic behavior.

8. During an acute phase of schizophrenia when the patient is experiencing hallucinations and delusions, the nurse should anticipate that the physician will prescribe which of the following medication categories listed below?

- A) An antipsychotic like risperidone
- B) A benzodiazepine like lorazepam
- C) A cholinesterase inhibitor like donepezil
- D) An opioid receptor antagonist like naltrexone

Ans: A

**Feedback:**

Pharmacological treatment with antipsychotics is often helpful particularly with the positive s/s of schizophrenia (delusion, hallucinations, agitation, etc.). The negative s/s of schizophrenia respond more favorably to the atypical antipsychotic drugs. Often antipsychotics are combined with benzodiazepines or antiparkinson agents during the acute phase of treatment to reduce the risk of extrapyramidal effects from large doses of antipsychotic agents. Distracters B and C are prescribed for Alzheimer disease and D is used for alcohol addiction.

9. Which of the following clinical manifestations would the nurse assess in the patient with bipolar disorder who is experiencing mania? Select all that apply.

- A) Labile mood
- B) Highly distractible
- C) Inflated self-esteem
- D) Despondent when asked questions
- E) Excessive sleepiness

Ans: A, B, C

**Feedback:**

Clinical manifestations of mania include decreased need for food and sleep, labile mood, irritability, racing thoughts, high distractibility, rapid and pressured speech, inflated self-esteem, and excessive involvement with pleasurable activities. Despondency is a symptom of the depressive phase.

10. A 44-year-old female has been diagnosed with major depression. Which of the following neuroimaging findings is most congruent with the woman's diagnosis?

- A) Decreased brain activity in the pons and brain stem
- B) Reduced activity and gray matter volume in the prefrontal cortex
- C) Atrophy and decreased blood flow in the amygdala
- D) Enlargement of the lateral and third ventricles and reduction in frontal and temporal volumes

Ans: B

**Feedback:**

In some cases of familial major depressive disorder and bipolar disorder, PET and MRI studies have demonstrated a reduction in the volume of gray matter in the prefrontal cortex, with an associated decrease in activity in the region. Brain stem involvement is not common, and the amygdala tends to have increased blood flow and oxygen consumption during depression. Enlargement of the lateral and third ventricles and reduction in frontal and temporal volumes are associated with schizophrenia.

11. After surviving an ischemic stroke, a 79-year-old male has demonstrated significant changes in his emotional behavior, with his family noting that he now experiences wide mood swings with exaggerated responses of empathy, anger, and sadness to situations. His care team would most likely attribute these responses to ischemic changes in which of the following brain structures?
- A) The man's occipital lobe
  - B) The client's temporal lobe in general and Wernicke area in particular
  - C) The man's parietal lobe
  - D) The components of the client's limbic system

Ans: D

**Feedback:**

The neural structures that constitute the limbic system are primarily responsible for the regulation of emotion. Clinical studies have suggested that this area of the brain is important for mood states and has extensive connections with the limbic system. The occipital lobe interprets visual information, while language is the domain of the Wernicke area. The parietal lobe processes sensory input.

12. A 20-year-old college student has presented to his campus medical clinic because of his unshakable despondency in recent months. He has been diagnosed with depression based on his signs, symptoms, and history. The nurse knows that which of the following treatments will likely be prescribed for this student?
- A) Medication that inhibits the reuptake of serotonin in his presynaptic space
  - B) Drugs that inhibit the accumulation of cyclic adenosine monophosphate (cAMP)
  - C) Benzodiazepines such as clonazepam that modulate his GABA receptors.
  - D) Cholinesterase inhibitors that potentiate the action of available acetylcholine
  - E) Antipsychotics such as olanzapine

Ans: A

**Feedback:**

SSRIs are common pharmacologic treatment modalities for depression. Drugs that inhibit the accumulation of cyclic adenosine monophosphate (cAMP) (answer B) are usually used in the treatment of bipolar depression. Benzodiazepines address anxiety, while cholinesterase inhibitors are used in the treatment of dementia. Antipsychotics are more often used in cases of schizophrenia.

13. A psychiatrist is providing care for a 68-year-old female whose anxiety disorder is significantly decreasing her quality of life. The nurse knows that the client will likely benefit from which of the following pharmacologic therapies listed below?
- A) A drug that influences gamma-aminobutyric acid (GABA) levels
  - B) An MAO inhibitor to increase the concentration of serotonin and norepinephrine
  - C) An antipsychotic medication that blocks dopamine receptors
  - D) A calcium channel-blocking agent

Ans: A

**Feedback:**

GABA is often implicated in anxiety disorders, and benzodiazepines address this neurotransmitter. An MAO inhibitor increases the concentration of serotonin and norepinephrine. MAO inhibitors are occasionally prescribed for depression not responding to SSRIs and would not be indicated for an anxiety disorder. Calcium channel blockers are good for lowering BP and minimizing arterial spasms but are usually not prescribed for anxiety.

14. A woman has a long-running compulsion to repeatedly check if the doors of her home are locked and has received a diagnosis of obsessive-compulsive disorder (OCD). Her husband is at a loss to understand her irrational behavior and has sought help from a therapist himself to deal with the effect that his wife's OCD is having on their daily lives. Which of the husband's following statements would require correction?
- A) "It's a relief to know that this can be changed if she continues with therapy and the medications she's been prescribed."
  - B) "It's odd that someone like her and someone who's depressed might both respond positively to the same drugs."
  - C) "I thought that this was something exceedingly rare, but I'm actually a bit relieved to learn that others have this disorder as well."
  - D) "I'm glad that this is something that's a result of life stressors and is not associated with any dysfunction in her brain."

Ans: D

**Feedback:**

OCD is thought to have a neurophysiological component and is not a consequence of stress. Medications combined with behavioral therapy provide a good prognosis, and SSRI antidepressants are often used. OCD has a prevalence of 2%.

15. A 50-year-old woman has experienced devastating consequences in her family and work life as a result of her long-standing alcohol addiction. The levels and pathways of which of the following neurotransmitters in her body are likely to differ from an individual without addiction?

A) Dopamine  
B) Acetylcholine  
C) Serotonin  
D) Norepinephrine

Ans: A

**Feedback:**

Dopamine levels are thought to be altered in addiction and possibly contribute to addiction. Acetylcholine, serotonin, and norepinephrine are not noted to play a central role in the neurophysiology of addiction.

16. The nurse knows that the patient admitted for opioid addiction may benefit from which of the following treatment modalities? Select all that apply.

A) Prescription for dolophine (Methadone)  
B) Administration of a long-term pain reliever like duragesic (Fentanyl)  
C) Involvement in a self-help group like Opioid Anonymous (an offshoot of Alcoholics Anonymous)  
D) Intense exercise therapy under supervision of a body builder  
E) Administering beta-blocking medications to minimize agoraphobia symptoms

Ans: A, C

**Feedback:**

Methadone, used in opiate addictions, has the narcotic properties of addiction and sedation, but lacks the euphoric effects of heroin. Naltrexone is used in treatment of alcohol and opiate addictions and works by blocking the opioid receptors and euphoric effects. Fentanyl is a pain medication, and Benadryl is an antihistamine.

17. Which of the following statements on the final diagnostic report regarding a computerized tomography (CT) of the head with contrast would lead health care providers to diagnose a patient with Alzheimer disease?

A) Large area of ischemia noted in the temporal lobe  
B) Too numerous to count beta-amyloid ( $\beta$ A) deposits noted  
C) Ninety percent obstruction in the posterior cerebral artery  
D) Mural thrombus of vertebrobasilar arteries

Ans: B

**Feedback:**

The major microscopic features of Alzheimer disease are the presence of neuritic (senile) plaques, neurofibrillary tangles, and amyloid angiopathy. Distracters A, C, and D are causes for a stroke.

18. A geriatrician and social worker are facilitating a family meeting for the children and wife of a 79-year-old man who has been diagnosed with Alzheimer disease. What goal of treatment will the clinicians most likely prioritize in their interactions with the family?
- A) Modest reversal of brain plaque formation and improved symptomatology through cholinesterase inhibitors
  - B) Surgical treatment of the underlying ischemic changes that underlie the manifestations of the man's disease
  - C) The use of medications such as donepezil and rivastigmine to slow the progression of the disease
  - D) Cognitive and behavioral therapy to counteract the agitation, depression, and suspiciousness associated with Alzheimer disease

Ans: C

**Feedback:**

Cholinesterase inhibitors like donepezil and rivastigmine may slow the progression of Alzheimer's but do not reverse the organic brain changes that characterize the etiology. Ischemic changes are associated with vascular dementia, and cognitive therapy is of limited use in treatment.

19. A 70-year-old woman has been brought to the emergency department by her daughter who noticed the woman is weak, confused, and forgetful in recent months, along with uncoordinated movements and visual disturbances at times. Which of the following questions by the physician are most likely to address her probable diagnosis? Select all that apply.
- A) "What medications is your mother currently taking?"
  - B) "Does your mother drink alcohol?"
  - C) "Does your mother have a history of stroke?"
  - D) "Is your mother facing significant stressors right now?"
  - E) "Is your mother lonely?"

Ans: A, B

**Feedback:**

The client's symptoms are characteristic of Wernicke-Korsakoff syndrome, which is associated with alcohol abuse. Medications can cause numerous cognitive and motor disturbances in elderly clients. Prior CVA and stress are less likely to contribute to her symptomatology.

20. Which of the following is the most likely course of Wernicke syndrome?
- A) If the symptoms are correctly diagnosed, most of the effects of the disease can be reversed through better nutrition and supplemental thiamine.
  - B) Wernicke syndrome is uniformly fatal, with death most often occurring within a few months of onset.
  - C) Wernicke syndrome has no treatment, but drugs may be used to treat its associated dyskinesias and behavioral disturbances.
  - D) The course of the disease is relentless, and most affected persons will die of infection within 2 to 10 years.

Ans: A

**Feedback:**

Wernicke syndrome is caused by a deficiency of thiamine (vitamin B<sub>1</sub>), and many of the symptoms are reversed when nutrition is improved with supplemental thiamine.

## Chapter 19- Disorders of Visual Function

1. A care aide at a long-term care facility has informed a resident physician that an 80-year-old woman's eyes appear to be inflamed and that her eyelids are caked with sticky secretions. The woman has been subsequently diagnosed with posterior blepharitis. Which of the following treatments is the physician likely to initiate?
- A) Surgical repair of the woman's blocked meibomian glands
  - B) Warm compresses to be applied regularly to her eyes in addition to oral antibiotics
  - C) Regularly scheduled cleansing of the woman's eyes with normal saline
  - D) Intravenous steroids coupled with topical antibiotic ointment

Ans: B

**Feedback:**

Treatment of posterior blepharitis is determined by associated conjunctival and corneal changes. Initial therapies can include warm compressing of the lids and use of flaxseed or fish oil tablets to provide omega-3 fatty acid benefits to meibomian oil secretions. Long-term, low-dose systemic antibiotic therapy guided by results of bacterial cultures along with short-term topical steroids may also be needed.

2. The father of a third grade girl has brought his daughter to a walk-in clinic because he believes the girl has pink eye, which has been going around the students in her class. The nurse at the clinic concurs with the father's suspicion of conjunctivitis. Which follow-up explanation by the nurse is most accurate?
- A) "The insides of her eyelids have become infected. This often produces severe discomfort."
  - B) "The surfaces of her eyes have bacteria or a virus established, and it's important to maintain good hand hygiene until it goes away."
  - C) "An antibiotic ointment will likely resolve her infection, but pain control will be necessary in the mean time."
  - D) "It's important to aggressively treat this in children, since damage to her sight can result if it's not treated."

Ans: B

**Feedback:**

Conjunctivitis often spontaneously resolves. The pain associated with conjunctivitis usually produces only mild discomfort compared with severe discomfort associated with corneal lesions or deep and severe pain associated with acute glaucoma. Conjunctivitis may spread to other family members. The corneal surface is not primarily involved, and pain that is severe suggests corneal involvement rather than conjunctivitis. Sight damage is not likely to result.



3. A 32-year-old man is complaining of burning, itching, photophobia, and severe pain in his right eye after swimming in the ocean. To determine that the eye condition was a corneal rather than a conjunctival disease, which of the following would be the distinguishing symptom?

A) Burning  
B) Itching  
C) Photophobia  
D) Severe pain

Ans: D

**Feedback:**

While burning, itching, and photophobia are all important symptoms of conjunctivitis, severe pain suggests corneal rather than conjunctival disease.

4. A 30-year-old woman has sought care because of her recurrent photophobia, tearing, and eye irritation. During assessment, her care provider asks about any history of cold sores or genital herpes. What is the rationale for the care provider's line of questioning?

A) Herpes simplex virus (HSV) conjunctivitis indicated a need for antiviral rather than antibacterial treatment.  
B) HSV infection of the cornea is a common cause of corneal ulceration and blindness.  
C) Chronic viral infection of the eyes can result in HSV autoinoculation of the mouth and labia.  
D) A history of HSV with eye irritation is suggestive of glaucoma.

Ans: B

**Feedback:**

Herpes simplex virus (HSV) keratitis (not conjunctivitis) with stromal scarring is the most common cause of corneal ulceration and blindness in the Western world.

Autoinoculation from the eyes to other sites is not common, and glaucoma is not noted to be a consequence or symptom of HSV infection.

5. Which of the following preoperative teaching points related to corneal transplantation is most justified?
- A) "You should know that there is a significant risk that your body will reject the transplant."
  - B) "The cornea is highly vascular, and therefore you will be at risk for hemorrhage."
  - C) "Your new cornea would come from someone who has recently died."
  - D) "You run a risk of developing a major inflammatory response post-op and will need frequent follow-up appointments."

Ans: C

**Feedback:**

Advances in ophthalmologic surgery permit corneal transplantation using a cadaver cornea. The low rejection rate is due to several factors: the cornea is avascular, which limits perfusion by immune elements; major histocompatibility complexes are virtually absent in the cornea; antigen-presenting cells are not present in great numbers; the cornea secretes immunosuppressive factors; and corneal cells secrete substances that protect against apoptosis, thereby minimizing inflammation.

6. Stepping out of a mall and into the sunshine has caused a man's pupils to constrict. Place the following anatomical components of the man's pupillary reflex in the ascending chronological order that they responded to the light. Use all the options.
- A) Oculomotor nuclei
  - B) Retinal ganglionic cells
  - C) Preganglionic neurons
  - D) Pretectal nuclei

Ans: B, D, C, A

**Feedback:**

Pretectal areas on each side of the brain are connected, explaining the binocular aspect of the light reflex. The afferent stimuli for pupillary constriction arise in the ganglionic cells of the retina and are transmitted to the *pretectal nuclei* at the junction of the thalamus and the midbrain and from there to preganglionic neurons in the oculomotor (CN III) nuclei via the pretectocolomotor tract.

7. During a physical exam, the nurse practitioner notes that the patient's optic disk is very pale with a larger size/depth of the optic cup. At this point, they are thinking the patient may have
- A) glaucoma.
  - B) diabetes retinopathy.
  - C) macular degeneration.
  - D) retinal tear.

Ans: A

**Feedback:**

The normal optic disk has a central depression called the optic cup. With progressive atrophy of axons caused by increased intraocular pressure, pallor of the optic disk develops, and the size and depth of the optic cup increase. Diabetes retinopathy, macular degeneration, nor retinal tear has these clinical manifestations.

8. A 46-year-old male has presented to the emergency department because of the eye pain, severe headache, and blurred vision that have followed an eye exam at an optometrist's office earlier in the day. The client tells the triage nurse that he received eye drops during the exam "to keep my pupils wide open." What differential diagnosis will the care team first suspect?
- A) Infectious conjunctivitis
  - B) Keratitis
  - C) Corneal trauma
  - D) Angle-closure glaucoma

Ans: D

**Feedback:**

Symptoms of acute angle-closure glaucoma are related to sudden, intermittent increases in intraocular pressure. These occur after prolonged periods in the dark, emotional upset, and other conditions that cause extensive and prolonged dilation of the pupil. Administration of pharmacologic agents such as atropine that cause pupillary dilation (mydriasis) also can precipitate an acute episode of increased intraocular pressure in persons with the potential for angle-closure glaucoma. Attacks of increased intraocular pressure are manifested by ocular pain and blurred or iridescent vision. The man's symptomatology is not characteristic of conjunctivitis, corneal trauma, or keratitis.

9. While working at the triage desk in the local emergency department, which of the following patients is likely having a medical emergency and needs to be seen first?
- A) A 17-year-old high school student who has a red, itchy eye
  - B) A 55-year-old truck driver complaining of sudden onset of ocular pain and blurred vision
  - C) A 45-year-old school teacher complaining of a red eye that is draining yellow secretions
  - D) An infant with red eyes who is irritable and refusing to eat

Ans: B

**Feedback:**

Attacks of increased intraocular pressure are manifested by ocular pain and blurred vision caused by corneal edema. Acute angle-closure glaucoma is an ophthalmic emergency. Treatment is directed at reducing the intraocular pressure, usually with pharmacologic agents.

10. If the anterior–posterior dimension of the eyeball is too long, the focus point for an infinitely distant target is anterior to the retina. This patient would be diagnosed as having
- A) hyperopia.
  - B) myopia.
  - C) cycloplegia.
  - D) presbyopia.

Ans: B

**Feedback:**

If the anterior–posterior dimension of the eyeball is too long, the focus point for an infinitely distant target is anterior to the retina. This condition is called myopia or nearsightedness. People with myopia can see close objects without problems. Hyperopia is farsightedness. Cycloplegia is paralysis of the ciliary muscle, with loss of accommodation. Presbyopia refers to a decrease in accommodation that occurs because of aging.

11. Which of the following individuals would be considered at high risk for developing cataracts? Select all that apply.
- A) An 88-year-old female with osteoporosis and congestive heart failure
  - B) A 51-year-old female whose rheumatoid arthritis is controlled with oral corticosteroids
  - C) A 50-year-old male who takes nebulized bronchodilators four times daily for the management of his emphysema
  - D) A 39-year-old woman with a history of open-angle glaucoma and poorly controlled diabetes
  - E) A 29-year-old artist who spends long hours in sunlight painting landscapes

Ans: A, B, D, E

**Feedback:**

Advanced age, steroid use, and sunlight exposure are all significant risk factors for the development of cataracts. Metabolically induced cataracts are caused by disorders of carbohydrate metabolism (diabetes). Use of bronchodilators is not noted to be strongly associated with cataracts.

12. A 37-year-old male has survived a logging accident in which the severing of his femoral artery and consequent blood loss resulted in cardiogenic shock. On recovery, one of the deficits that he finds most frustrating is a significant loss of visual acuity. Which is the most likely rationale for his vision damage?
- A) Decreased cerebral perfusion results in progressive damage to the optic nerve.
  - B) Circulatory collapse causes rapid death of retinal neurons.
  - C) Lack of oxygen results in a distortion of the fovea.
  - D) The visual cortex is susceptible to hypoxic necrosis.

Ans: B

**Feedback:**

Acute decreased circulation can result in sight damage from edema and death of retinal neurons. Damage to the optic nerve, the fovea, and the visual center are not likely to be contributing factors.

13. Which of the following patients would be considered high risk for developing papilledema? Select all that apply.
- A) A 2-year-old patient who has a shunt placed following delivery where he was diagnosed with hydrocephalus
  - B) A 55-year-old male with substernal chest pain radiating down both arms and experiencing nausea
  - C) A 43-year-old male with diabetes, renal insufficiency, and BP 200/107
  - D) A 25-year-old motorcyclist who was in an accident and has a potential subdural hematoma
  - E) An 18-year-old female complaining of severe cramps with her menstrual bleeding

Ans: A, C, D

**Feedback:**

The most common conditions causing increased intracranial pressure include cerebral tumors, subdural hematoma, hydrocephalus, and malignant hypertension. Possible MI is not one of the causes of increased intracranial pressure.

14. A 31-year-old female has been recently diagnosed with type 2 diabetes mellitus and is attending a diabetes education class. Which of the following statements by the woman demonstrates an accurate understanding of her health problem?
- A) "I'll have to control my blood sugars, my blood pressure, and my cholesterol in order to make sure I don't develop sight problems."
  - B) "I'm grieving the fact that I won't be able to get pregnant without causing permanent damage to my vision."
  - C) "It's surprising that sugar in my blood can accumulate on the lens of my eye and cause a loss of sight."
  - D) "I want to avoid going through the treatments for sight restoration that I would need if my diabetes causes damage to my vision."

Ans: A

**Feedback:**

The threat to vision that is posed by poorly controlled blood sugar levels is compounded by high blood pressure and/or cholesterol levels. Pregnant women with diabetes need additional care to monitor their sight, but they will not necessarily lose it. The damage caused by diabetes does not occur on the lens, and restoration of lost visual acuity is not normally possible.

15. A college junior calls his mother, a nurse, complaining of “not being able to see.” When questioned further, he describes, “A gray curtain just went down my right visual field. I don't know what to do.” The nurse should recognize this symptom as which of the following conditions and have her teenager go to the emergency department immediately.

- A) Glaucoma
- B) Strabismus
- C) Retinal detachment
- D) Macular degeneration

Ans: C

**Feedback:**

The primary symptom of retinal detachment consists of painless changes in vision. Commonly, flashing lights or sparks, followed by small floaters or spots in the field of vision, occur as the vitreous pulls away from the posterior pole of the eye. As detachment progresses, the person perceives a shadow or dark curtain progressing across the visual field.

16. A public health nurse is teaching a health promotion class to a group of older adults at a seniors' center. A woman attending states that, “My husband has got dry macular degeneration, and I don't know what we're going to do when he goes blind from it.”

How can the nurse best respond to the woman's statement?

- A) “Vitamins C and E as well as zinc and beta carotene may have some value in slowing the progression of his disease.”
- B) “You should talk to your doctor about the surgical options that might help preserve his sight.”
- C) “If your husband can lower his blood pressure and bad cholesterol, it can possibly slow the progression of his disease.”
- D) “Cataract surgery is showing promise as a way of replacing the part of the eye associated with macular degeneration.”

Ans: A

**Feedback:**

Vitamin E, vitamin C (ascorbic acid), zinc, and beta carotene have shown promise at slowing the progression of the age-related macular degeneration in persons with the disease. Surgical options are not normally available for the dry variety of macular degeneration. Blood pressure control, cholesterol control, and cataract surgery are unlikely to be directly useful.

17. A patient has sought medical attention because of a loss of different half-fields in the two eyes. Knowing the potential causes of this complaint, the nurse anticipates that the physician will order tests looking for
- A) metal fragments in the eyes.
  - B) hemorrhages in the capillaries of both eyes.
  - C) an enlarging pituitary tumor.
  - D) subarachnoid hemorrhage.

Ans: C

**Feedback:**

Enlarging pituitary tumors can produce longitudinal damage through the optic chiasm with loss of medial fibers of the optic nerve representing both nasal retinas and both temporal visual half-fields. The loss of different half-fields in the two eyes is called a heteronymous loss. Metal fragments can get in the eye from welding. Hemorrhages in both eyes have numerous causes like uncontrolled hypertension and diabetes. Subarachnoid hemorrhages are usually trauma related.

18. As the eyes rotate upward, the upper eyelid reflexively retracts. Which cranial nerve is primarily responsible for this response?
- A) Cranial nerve I
  - B) Cranial nerve III
  - C) Cranial nerve VI
  - D) Cranial nerve IV

Ans: B

**Feedback:**

The CN III (oculomotor) nucleus, which extends through a considerable part of the midbrain, contains clusters of lower motor neurons for each of the five eye muscles it innervates. Because of its plane of attachment, the inferior oblique rotates the eye in the frontal plane pulling the top of the eye laterally. In other words, as the eyes rotate upward, the upper eyelid is reflexively retracted, and in the downward gaze, it is lowered, restricting exposure of the conjunctiva to air and reducing the effects of drying. CN I is involved in olfactory function; CN VI (abducens nerve) innervates the lateral rectus, which abducts the eye. CN IV (trochlear nerve) innervates the superior oblique muscle, which depresses, rotates laterally, and intorts the eyeball.



19. A 4-month-old infant and his mother are at an appointment with a pediatrician to follow up his nonaccommodative strabismus and to determine a treatment plan. Which of the following treatments is most likely to prevent future loss of vision?
- A) Prescribing glasses once the infant is 6 months of age
  - B) Use of beta-adrenergic blockers and latanoprost eye drops
  - C) Regularly scheduled eye exams and monitoring of self-correction of his eyes
  - D) Surgical correction of the musculature

Ans: D

**Feedback:**

Strabismus is ideally treated by surgery rather than with glasses in the case of infants. The condition will not resolve independently, and medications are unlikely to help the condition.

20. A 3-year-old girl has been diagnosed with amblyopia. Which of the following pathophysiological processes is most likely to underlie her health problem?
- A) The child may have a congenital deficit of rods and/or cones.
  - B) The girl may have chronic bacterial conjunctivitis.
  - C) She may have been born with infantile cataracts.
  - D) The child may have a neural pathway disorder.

Ans: C

**Feedback:**

There are multiple potential causes of amblyopia, including cataracts. A deficit of rods or cones, a neural pathway disorder, and chronic conjunctivitis are not noted to be common precursors.

## Chapter 20- Disorders of Hearing and Vestibular Function

1. During a procedure to remove impacted cerumen, the nurse should be assessing the patient for which of the following most critical complications?

A) Excessive bleeding from the ear  
B) Pain related to instillation of warm fluids to soften the cerumen  
C) Symptomatic bradycardia from vagal nerve innervation  
D) Respiratory distress related to fluid entering bronchiole tubes

Ans: C

**Feedback:**

Because the external auditory canal is innervated by the auricular branch of the vagus nerve, coughing or even cardiac deceleration can result from stimulation of the canal by cerumen impactions or removal attempts. Since this just involves irrigation using a bulb syringe and warm tap water, bleeding should not occur. Pain may occur but is not a critical complication. Since the fluid is going into the ear canal, there should be no fluid entering the respiratory system.

2. A 60-year-old man has presented to his family physician following an earache that has become progressively more painful in recent days. Following a history and examination with an otoscope, the man has been diagnosed with otitis externa. Which of the physician's following statements to the man is most accurate?

A) "You'll need to avoid getting any water in your ear until you finish your course of antibiotic pills."  
B) "I'm going to instill some warm water into your ear to flush out debris and bacteria."  
C) "I'll prescribe some ear drops for you, and in the mean time, it's important not to use ear swabs."  
D) "This likely happened because your ears aren't draining like they should, but antibiotics that you'll put in your ears will resolve this."

Ans: C

**Feedback:**

Antimicrobial ear drops are the standard treatment for otitis externa, and the ears must be protected from trauma during infection. Oral antibiotics are not commonly used, and flushing the ears is not indicated for the condition. A lack of normal ear drainage is not part of the etiology of otitis externa.

3. During descent, an airplane passenger is complaining that his “ears are plugged.” What aspect of the structure and function of the ear best accounts for the passenger's complaint?

- A) The inner ear adjusts its volume in response to atmospheric pressure, increasing during low pressure and decreasing in high pressure.
- B) The eustachian tubes must remain patent to equalize pressure between the middle ear and inner ear.
- C) The tympanic membrane is selectively permeable in order to accommodate pressure changes, and this capacity is often impaired during upper respiratory infections.
- D) Air must be able to flow between the middle ear and nasopharynx in order to accommodate pressure changes.

Ans: D

**Feedback:**

The eustachian tubes between the middle ear and nasopharynx must be patent to allow for changes in atmospheric pressure. Pressure is not accommodated by changing the volume of the middle ear, and the tympanic membrane is not selectively permeable to air.

4. A 4-year-old boy has had otitis media with effusion (OME) for several weeks, and his condition has recently progressed to acute otitis media (AOM). Which of the following factors could have contributed to his AOM? Select all that apply.

- A) Reflux of fluid from the boy's nose into his middle ear
- B) A deficiency in immunoglobulin M
- C) Accumulation of cerumen in the external acoustic meatus
- D) Sensorineural deficits in the auditory control apparatus
- E) Exposure to respiratory virus

Ans: A, E

**Feedback:**

Reflux via the eustachian tubes, IgG deficiency, and exposure to RSV have all been implicated in the development of AOM. Cerumen accumulation in the outer ear, deficient IgM, and sensorineural deficits are unlikely to contribute to AOM.

5. Which of the following would be considered an abnormal finding when the nurse practitioner uses an otoscope to look at a toddler's ear? The tympanic membrane is described as
- A) "transparent."
  - B) "a shallow, oval cone pointing inward toward apex."
  - C) "small, whitish cord seen traversing the middle ear from back to front."
  - D) "yellow, amber discoloration noted."

Ans: D

**Feedback:**

Otoscopic signs of middle ear effusion will be seen in the tympanic membrane as a yellow, amber discoloration. All of the other distracters are normal findings.

6. When educating the parents of a child who has just had tympanostomy tube insertion, the nurse should provide further teaching if the parents say which of the following statements?
- A) "I will call the physician if I see that the tube has come out."
  - B) "I will be looking for any drainage coming from the ears."
  - C) "I'm so glad that we can take the child swimming next week when we go on vacation."
  - D) "I'm so glad we had the child tested for allergies prior to having these tubes placed."

Ans: C

**Feedback:**

After tube insertion, the ears of children with tubes must be kept out of water. All of the other distracters are normal post-op teaching for this procedure. Anytime a device comes out after surgery, the physician should be notified. Routine post-op education includes looking for infection, which in this case could be fever, increase in drainage from the ear, or restlessness. Prior to surgery, most children with recurrent otitis media have allergy testing performed.

7. A 29-year-old woman has been diagnosed with otosclerosis after several years of progressive hearing loss. What pathophysiological process has characterized her diagnosis?
- A) New spongy bone has been formed around her stapes and oval window.
  - B) Her incus, malleus, and stapes have become disconnected from her normal neural pathways.
  - C) Her temporal bone is experiencing unusually rapid resorption.
  - D) Her tympanic cavity is becoming filled with bone due to inappropriate osteogenesis.

Ans: A

**Feedback:**

Otosclerosis begins with resorption of bone in one or more foci. During active bone resorption, the bone structure appears spongy and softer than normal (*i.e.*, osteospongiosis). The resorbed bone is replaced by an overgrowth of new, hard, sclerotic bone. Distortion of neural pathways, resorption of the temporal bone, and filling of the tympanic cavity do not occur with otosclerosis.

8. Distraught at the persistent ringing in his ears and his inability to alleviate it, a 50-year-old man has visited his health care provider. After diagnostic testing, no objective cause (like impacted cerumen or vascular abnormality) was found. Given these testing results, which of the following teaching points by the care provider is most appropriate?
- A) "This is most often the result of a psychological disturbance, and therapy is often useful in relieving tinnitus."
  - B) "There are many drugs such as blood pressure pills, relaxants, heart medications, and antihistamines that can cause tinnitus."
  - C) "A specialist can listen with a sensitive microphone to determine whether you are actually hearing these sounds."
  - D) "There are some treatments like tinnitus retraining therapy, which includes the extended use of low-noise generators, which has shown good success."

Ans: D

**Feedback:**

Current treatment modalities for tinnitus address the symptoms of the problem rather than curing the underlying etiology. While therapy can be of some use, it is inaccurate to characterize tinnitus as a psychological disturbance. Medications, including antihistamines, anticonvulsant drugs, calcium channel blockers, benzodiazepines, and antidepressants, have been used for tinnitus alleviation; they are not implicated as a cause. While listening to differentiate between objective and subjective tinnitus is possible, the absence of objective sounds does not mean that tinnitus does not exist, rather that it is subjective. The use of tinnitus retraining therapy, which includes directive counseling and extended use of low-noise generators to facilitate auditory adaptation to the tinnitus, has met with considerable success.

9. Following focal seizures that have damaged the dominant hemisphere of a patient's auditory association cortex, the nurse may observe the patient displaying
- A) receptive aphasia.
  - B) facial drooping.
  - C) auditory hallucinations.
  - D) delusions of grandeur.

Ans: A

**Feedback:**

Damage to the auditory association cortex, especially if bilateral, results in deficiencies of sound recognition and memory (auditory agnosia). If the damage is in the dominant hemisphere, speech recognition can be affected (sensory or receptive aphasia). The others are not caused by focal seizures.

10. Following a serious bout of bacterial meningitis, the parents of a 14-month-old has noted the child is not responding to verbal commands. The nurse will explain the pathophysiologic principle behind this by educating the patients by which of the following statements?
- A) "This could be caused by the same organism that caused the meningitis, infecting the child's tympanic membrane."
  - B) "This may be due to a loss of hair cells and damage to the auditory nerve."
  - C) "The ear and the lining of the brain that was infected are all connected together."
  - D) "It is common for meningitis to use up all the natural killer cells and therefore increase the risk of having brain tumors develop."

Ans: B

**Feedback:**

Deafness or some degree of hearing impairment is the most common serious complication of bacterial meningitis in infants and children. The mechanism causing hearing impairment seems to be suppurative labyrinthitis or neuritis resulting in the loss of hair cells and damage to the auditory nerve. There is no direct connection between the meninges of the brain and the tympanic membrane. Bacterial meningitis is not associated with an increased risk of developing a brain tumor.

11. Which of the following questions is most likely to be clinically useful in the differential diagnosis of sensorineural versus conductive hearing loss?
- A) "What medications do you currently take?"
  - B) "What effect is this hearing loss having on your quality of life?"
  - C) "Has your hearing loss developed quickly or more slowly?"
  - D) "Do you ever hear a persistent ringing in your ears?"

Ans: A

**Feedback:**

Conductive hearing loss occurs when auditory stimuli are not adequately transmitted through the auditory canal, tympanic membrane, middle ear, or ossicle chain to the inner ear. It can be a temporary loss from impacted cerumen. Sensorineural hearing loss occurs with disorders that affect the inner ear, auditory nerve, or auditory pathways to the brain. Numerous drugs have ototoxic potential, a consequence of which is sensorineural hearing loss. The onset and course of hearing loss and the presence or absence of tinnitus do not necessarily help to differentiate between conductive and sensorineural hearing loss. The subjective effect of the client's hearing loss, while a valid concern, does not help with the differential diagnosis.

12. Otitis media (OM), which can occur in any age group, is the most common diagnosis made by health care providers who care for children. Which bacterial pathogen causes the largest proportion of cases that result in sensorineural hearing loss?
- A) *Streptococcus pneumoniae*
  - B) Acoustic neuromas
  - C) *Haemophilus influenzae*
  - D) Parainfluenza

Ans: A

**Feedback:**

*S. pneumoniae* is the most common cause of bacterial meningitis that results in sensorineural hearing loss after the neonatal period. Acoustic neuromas are cancers that cause impaired hearing. Parainfluenza and influenza viruses are common viral pathogens in OM.

13. As part of a health promotion initiative, a public health nurse is meeting with a group of older adult residents of an assisted living facility. Which of the following teaching points about hearing loss in the elderly should the nurse include in the teaching session?
- A) "It is actually a myth that seniors have worse and worse hearing as they age."
  - B) "Most hearing loss in older adults is the result of easily fixed problems, such as impacted ear wax."
  - C) "Experts don't quite know what causes seniors to lose their hearing with age, but drugs like aspirin can contribute to the problem."
  - D) "With older adults, the goal is to adjust lifestyle to accommodate diminished hearing rather than trying to treat the hearing loss itself."

Ans: C

**Feedback:**

Presbycusis is an identified phenomenon that is thought to be multifactorial, and ototoxic drugs are known to contribute significantly to hearing loss in the elderly. Sensorimotor etiologies are most common, and while lifestyle modifications are often necessary, this does not rule out treatment of the hearing loss.

14. A stroke affecting which of the following areas of the brain would be most likely to leave an individual's vestibular system intact and posture and balance maintained?
- A) The brain stem
  - B) The thalamus
  - C) The temporal and parietal cortex
  - D) The limbic system of the cerebrum

Ans: D

**Feedback:**

While the brain stem, thalamus, and temporal and parietal cortex are components of the vestibular apparatus, the limbic system is not a central component of the maintenance of posture and balance.

15. Which of the following individuals is most likely to be diagnosed with a central vestibular disorder?
- A) A man who got up quickly from his bed and sustained an injury after he "blacked out"
  - B) A woman who has ongoing difficulty in balancing herself when walking
  - C) A woman who suffered a loss of consciousness after being struck on the head during a soccer game
  - D) A man who states that he feels car sick whenever he rides in the back seat of a vehicle

Ans: B

**Feedback:**

Central vestibular disorders are marked by a sensation of motion that interferes with balance but that is mild and constant and chronic in duration. It should be differentiated from postural hypotension, loss of balance from a head injury, or motion sickness.



16. While a travel during a vacation via car, the mother notes that her 14-year-old child is getting sick. The mother suspects motion sickness. Which of the following clinical manifestations would confirm this diagnosis? Select all that apply.

- A) Rapid breathing
- B) Feeling faint
- C) Red, flushed face
- D) Rapid pulse rate
- E) Severe balance problems

Ans: A, B, D

**Feedback:**

Autonomic signs (of motion sickness) including lowered BP, tachycardia, and excessive sweating may occur. Hyperventilation produces changes in blood volume and pooling of blood in the lower extremities, leading to postural hypotension and sometimes syncope. Red, flushed face is usually associated with elevated temperature. Severe balance problems are usually associated with irritation or damage of the vestibular end organs.

17. A 70-year-old woman with a diagnosis of benign paroxysmal positional vertigo (BPPV) is receiving teaching from her physician about her diagnosis. The client is eager to avoid future episodes of vertigo and has asked the physician what she can do to prevent future episodes. How can the physician best respond?

- A) "Unfortunately there aren't any proven treatments for your condition."
- B) "There are some exercises that I'll teach you to help reorient your inner ear and prevent vertigo."
- C) "Although they involve some risks, there are some options for ear surgery that can prevent future vertigo."
- D) "We usually don't actively treat BPPV unless it starts to affect your hearing."

Ans: B

**Feedback:**

Nondrug therapies for BPPV using habituation exercises and canalith repositioning are successful in many people. Canalith repositioning involves a series of maneuvers in which the head is moved to different positions in an effort to reposition the free-floating debris in the endolymph of the semicircular canals. Surgery is not a noted treatment option, and even in the absence of hearing loss, treatment is warranted.

18. A 30-year-old woman has presented to her family doctor complaining of three distressing episodes over the last several months during which she got extremely dizzy, had loud ringing in her ears, and felt like her ears were full of fluid. She states that her hearing diminishes, and she feels nauseous during these episodes. What diagnosis is the physician most likely to first suspect?

A) Acute otitis media  
B) Acute vestibular neuronitis  
C) Benign paroxysmal positional vertigo (BPPV)  
D) Ménière disease

Ans: D

**Feedback:**

Ménière disease is characterized by fluctuating episodes of tinnitus, feelings of ear fullness, and violent rotary vertigo that often renders the person unable to sit or walk. There is a need to lie quietly with the head fixed in a comfortable position, avoiding all head movements that aggravate the vertigo. Symptoms referable to the autonomic nervous system, including pallor, sweating, nausea, and vomiting, usually are present. The more severe the attack, the more prominent are the autonomic manifestations. A fluctuating hearing loss occurs with a return to normal after the episode subsides. Her symptomatology is not characteristic of AOM, acute vestibular neuronitis, or BPPV.

19. When assessing a patient diagnosed with brain stem ischemia complaining of vertigo, the nurse will likely observe which of the following clinical manifestations? Select all that apply.

A) Inability to coordinate voluntary muscular movements  
B) Difficulty in articulating words  
C) Feelings of ear fullness  
D) Deafness  
E) Facial weakness

Ans: A, B, E

**Feedback:**

Inability to coordinate voluntary muscular movements (ataxia), difficulty in articulating words (dysarthria), and facial weakness are usually associated with brain stem ischemia. Fullness in the ear is often a sign of Ménière disease. Deafness is usually not associated with brain stem ischemia.

20. As part of the diagnostic workup for a client's long-standing vertigo, a clinician wants to gauge the eye movements that occur in the client. Which of the following tests is the clinician most likely to utilize?

- A) Romberg test
- B) Rotational tests
- C) Electronystagmography (ENG)
- D) Caloric stimulation

Ans: C

**Feedback:**

ENG is an examination that records eye movements in response to vestibular, visual, cervical (vertigo triggered by somatosensory input from head and neck movements), rotational, and positional stimulation. With ENG, the velocity, frequency, and amplitude of spontaneous or induced nystagmus and the changes in these measurements brought by a loss of fixation, with the eyes open or closed, can be quantified. The Romberg test, rotational tests, and caloric stimulation do not allow for these data.

## Chapter 21- Blood Cells and the Hematopoietic System

1. A 5th grade elementary student asks the school nurse how much blood is in an entire body. The nurse should respond that the average grown-up adult has
  - A) 2 to 4 cups of blood in his or her body.
  - B) 3 pints of blood in total.
  - C) 3 to 4 quarts of blood in his or her body.
  - D) 5 to 6 L of blood throughout his or her body.

Ans: D

**Feedback:**

The total volume of blood in the average adult is about 5 to 6 L, and it circulates throughout the body within the confines of the circulatory system.

2. A hospital laboratory technician is performing routine blood analysis as part of an inpatient's assessment and is examining the sample in a test tube following processing in a centrifuge and the addition of an anticoagulant. Which of the following observations would the technician most likely interpret as an anomaly?
  - A) The bottom layer of blood in the tube accounts for around one third of the total volume.
  - B) The middle layer of cells appears white to gray in color.
  - C) The top layer of cells is too thin to visualize without microscopy.
  - D) The yellowish fluid on the top of the sample appears to constitute around one half of the total volume.

Ans: A

**Feedback:**

The body layer of cells in a centrifuged blood sample consists of erythrocytes and should constitute around 42% to 47% of the total blood volume. The middle cell layer of leukocytes should appear whitish gray, and the thrombocytes above that layer are frequently not discernable. The plasma layer should account for around 55% of the total blood volume.

3. During science class, a student asks, “What's the difference between plasma and serum in the blood?” The nurse responds that the primary difference between plasma and serum is that plasma contains
- A) fibrinogen.
  - B) heparin.
  - C) white blood cells.
  - D) hydrogen ions.

Ans: A

**Feedback:**

The major difference between plasma and serum is the presence of fibrinogen in the plasma from an anticoagulated centrifuged whole-blood specimen. When blood is removed from the body for testing, it clots within 30 to 60 minutes. The clot contains the blood's cellular components enmeshed in an insoluble fibrin network (formed by the polymerization of soluble plasma protein fibrinogen). The remaining fluid portion is the yellow liquid serum. This serum no longer contains fibrinogen because the fibrinogen originally present in uncoagulated blood was used up in the formation of the blood clot. Heparin, WBC, and hydrogen ions are incorrect.

4. A student makes the statement to a colleague, “Blood plasma is essentially just a carrier for the formed elements like red blood cells and white blood cells.” What would be the most accurate response to this statement?
- A) “That's not really true. Plasma is crucial in the immune and inflammatory responses.”
  - B) “Actually, plasma plays a significant role in nutrient and waste transport.”
  - C) “Not really. Plasma also contributes to the processes of protein synthesis and hematopoiesis.”
  - D) “Actually, plasma is integral to the proper function of the liver and maintenance of acid–base balance.”

Ans: B

**Feedback:**

Plasma proteins are integral to transport. They are not noted to contribute to the inflammatory response, hematopoiesis, protein synthesis, or liver function.

5. The blood work of a 44-year-old male patient with a diagnosis of liver disease secondary to alcohol abuse indicates low levels of albumin. Which of the following phenomena would a clinician be most justified in anticipating?
- A) Impaired immune function
  - B) Acid–base imbalances
  - C) Impaired thermoregulation
  - D) Fluid imbalances

Ans: D

**Feedback:**

Albumin plays a central role in the maintenance of osmotic pressure and fluid balance. Immune function, acid–base balance, and thermoregulation are not functions of albumin.

6. A nurse practitioner is providing care for a client with low levels of the plasma protein gamma globulin. The nurse would recognize that the client is at risk of developing which of the following health problems?
- A) Jaundice
  - B) Anemia
  - C) Infections
  - D) Blood clots

Ans: C

**Feedback:**

The gamma globulins, antibodies of the immune system, protect against infectious diseases. Because alpha globulin transports bilirubin, a defect in this plasma protein might lead to jaundice; a defect of beta globulin, which transports iron, could be associated with anemia; and a defect of fibrinogen could result in blood clots.

7. Which of the following statements best conveys a characteristic of red blood cells?
- A) They lack organelles and soluble enzymes.
  - B) They contribute to the maintenance of blood pH.
  - C) They help maintain the body's fluid balance.
  - D) They are self-replicating.

Ans: B

**Feedback:**

Erythrocytes contribute to acid–base balance through the production of bicarbonate and hydrogen ions. They contain soluble enzymes but are neither self-replicating nor involved in fluid balance.

8. When looking at a granulocyte under a microscope, the anatomy student would describe it as a cell
- A) lacking granules.
  - B) having a kidney-shaped nucleus.
  - C) having no nuclei.
  - D) shaped like a sphere with multilobar nuclei.

Ans: D

**Feedback:**

Granulocytes are spherical and have distinctive multilobar nuclei. They are all phagocytic cells that are identifiable because of their cytoplasmic granules. Answers A, B, and C are incorrect. Agranulocytes lack granular cytoplasm. Monocytes have a large amount of cytoplasm and a nucleus in the shape of a kidney. Erythrocytes lack a cell nucleus.

9. Following an injury resulting in a small cut from a knife, the first cells to go to the area of the cut would be the
- A) neutrophils.
  - B) erythrocytes.
  - C) albumin.
  - D) basophils.

Ans: A

**Feedback:**

Neutrophils are very mobile and are the first cells to go to an area of tissue damage. Erythrocytes (RBCs) contain an O<sub>2</sub>-carrying protein that functions in the transport of oxygen. Albumin, a plasma protein, does not pass through the pores in the capillary wall to enter the interstitial fluid and therefore contributes to the plasma osmotic pressure and maintenance of blood volume. Basophil granules contain heparin, an anticoagulant; histamine, a vasodilator; and other mediators of inflammation.

10. A 29-year-old construction worker got a sliver under his fingernail 4 days ago. The affected finger is now reddened, painful, swollen, and warm to touch. Which of the following hematological processes is most likely occurring in the bone marrow in response to the infection?

A) Proliferation of immature neutrophils  
B) High circulatory levels of myeloblasts  
C) Increased segmented neutrophil production  
D) Phagocytosis by myelocytes

Ans: A

**Feedback:**

A part of the immune response is the proliferation of neutrophils in response to infectious organisms. Neutrophilia is an increase in immature neutrophils (“bands”) most commonly seen in acute infections and tissue injuries that promote the accelerated release of neutrophils and their precursors into the circulation. Myeloblasts are not normally found in circulation, and segmented neutrophils would not yet have reached maturity (takes approximately 2 weeks to mature). Myelocytes do not perform phagocytosis.

11. When talking about the lifespan of various blood components, the students should know that once a neutrophil moves into tissue, it lives approximately for how long?

A) 12 hours  
B) 24 hours  
C) 2 days  
D) 4 days

Ans: D

**Feedback:**

After release from the marrow, the neutrophils spend only approximately 4 to 8 hours in the circulation before moving into the tissues. They survive in the tissues for approximately 4 to 5 days. They die in the tissues by discharging their phagocytic function.

12. When talking about the various types of granulocytes, which granule contains heparin, an anticoagulant?

A) Neutrophils  
B) Eosinophils  
C) Basophils  
D) Lymphocytes

Ans: C

**Feedback:**

The basophils have granules that contain heparin, an anticoagulant; histamine, a vasodilator; and other mediators of inflammation.



13. A physician is explaining to a 40-year-old male patient the importance of completing his course of antibiotics for the treatment of tuberculosis. The physician explains the damage that could occur to lung tissue by *Mycobacterium tuberculosis*. Which of the following phenomena would underlie the physician's explanation?

A) Tissue destruction results from neutrophil deactivation.  
B) Nonspecific macrophage activity leads to pulmonary tissue destruction and resulting hemoptysis.  
C) Macrophages form a capsule around the *Mycobacterium tuberculosis* bacteria, resulting in immune granulomas.  
D) Neutrophils are ineffective against the *Mycobacterium tuberculosis* antigens.

Ans: C

**Feedback:**

Immune granulomas are caused by insoluble particles (*Mycobacterium tuberculosis*) that are capable of inciting a cell-mediated immune response. Neutrophils are deactivated, self-destructive, nor ineffective in cases of tuberculosis.

14. A couple who is expecting their first child has been advised by friends to consider harvesting umbilical cord blood in order to have a future source of stem cells. The couple has approached their caregiver with this request and is seeking clarification of exactly why stem cells are valuable and what they might expect to gain from harvesting it. How can their caregiver best respond to the couple's enquiry? Stem cells can

A) "help correct autoimmune diseases and some congenital defects."  
B) "be used to regenerate damaged organs should the need ever arise."  
C) "be used as source of reserve cells for the entire blood production system."  
D) "help treat some cancers and anemias, but they must come from your child himself or herself."

Ans: C

**Feedback:**

The proliferative potential and self-renewal of stem cells make them a compensatory mechanism and reserve source for the entire hematopoietic system. While they could be of possible use in certain autoimmune conditions or in cases of organ failure, these statements do not capture their essence. Stem cells can also come from a histocompatible donor.

15. Which of the following statements best captures an aspect of the process of hematopoiesis?
- A) Colony-stimulating factors (CSFs) produce cytokines that activate progenitor cells.
  - B) Progenitor cells differentiate into precursor cells.
  - C) Various subtypes of pluripotent stem cells eventually differentiate into the cellular components of blood.
  - D) Self-replicating precursor cells differentiate into specific CSFs.

Ans: B

**Feedback:**

During hematopoiesis, progenitor cells differentiate into precursor cells, which in turn differentiate into the cellular components of blood. Cytokine stimulation precedes and regulates the process, and there are no different subtypes of pluripotent stem cells. Precursor cells are not self-replicating.

16. Which of the following colony-stimulating factors (CSFs) is given to ESRD patients to help with their chronic anemia?
- A) Erythropoietin (EPO)
  - B) Thrombopoietin (TPO)
  - C) Neupogen
  - D) Interleukin

Ans: A

**Feedback:**

The CSFs that act on committed progenitor cells include erythropoietin (EPO), which stimulates RBC production. TPO stimulates platelets. Neupogen is for white blood cell production. Interleukin is a cytokine utilized as an immune response agent.

17. A nurse is providing care for several patients on an acute medical unit of a hospital. Which of the following patients would be most likely to benefit from hematopoietic growth factors?
- A) A 51-year-old female patient with liver failure secondary to hepatitis
  - B) A 61-year-old female patient with end-stage renal cancer
  - C) A 55-year-old obese male patient with peripheral neuropathy secondary to diabetes
  - D) A 44-year-old man with a newly diagnosed brain tumor

Ans: B

**Feedback:**

Hematopoietic growth factors are commonly used in cases of kidney disease and cancer. Erythropoietin (EPO) is a colony-stimulating factor that stimulates red blood cell production. As a review, erythropoietin is an essential hormone for red cell production. Without it, definitive erythropoiesis does not take place. Under hypoxic conditions, the kidney will produce and secrete erythropoietin to increase the production of red blood cells. With cancer of the kidney, the kidney is unable to perform its normal function. They are not as clearly indicated in cases of liver disease, diabetes, or brain tumors.

18. A geriatrician is following a number of clients on a subacute geriatric medical unit, some of whom require diagnostic blood work. Which of the following clients would be most likely to have an erythrocyte sedimentation rate (ESR) screening test ordered? An adult with
- A) a diagnosis of Alzheimer disease and depression.
  - B) orthostatic hypotension and syncopal episodes.
  - C) congestive heart failure.
  - D) systemic lupus erythematosus.

Ans: D

**Feedback:**

Inflammatory diseases, such as systemic lupus erythematosus, are a common indicator for an ESR test. The other health problems noted are less commonly marked by inflammatory processes.

19. An oncologist has ordered a bone marrow biopsy for a client and is explaining the reasons for the test and what the client might expect during the test. Which of the following explanations best reflects an aspect of a bone marrow biopsy?
- A) "I'll take a sample of your bone marrow from your breastbone or your spine."
  - B) "I will be harvesting a sample of your stem cells for examination."
  - C) "I need a more accurate count of your blood components than normal blood work is able to provide."
  - D) "I need to get samples of the types of blood cells that your body is producing."

Ans: D

**Feedback:**

Bone marrow biopsy can be used to detect abnormal cell production and gain samples. A sample would be taken most likely from the iliac crest, and the biopsy would not focus on pluripotent stem cells. Bone marrow biopsy is not used for simple quantification of blood cellular components.

20. Following a bone marrow biopsy, which of the following assessments would indicate the patient is experiencing a complication as a result of this diagnostic procedure?
- A) BP 90/60, heart rate 132, excess bleeding, and hematoma noted at the insertion site
  - B) BP 130/80, oxygen saturation 95%, and crackles heard on inspiration
  - C) Respiratory rate 24 and complaining of pain at insertion site
  - D) Heart rate regular 64 beats/minute and temperature 99.6°F orally

Ans: A

**Feedback:**

The major hazard of a bone marrow biopsy is the risk of hemorrhage. This is usually seen by a decrease in BP, tachycardia, edema from blood pooling in the tissues, etc. All of the other answers are s/s other than shock. Crackles in the lungs correlate with fluid/secretions in the lungs. A bone marrow aspiration is usually performed on the posterior iliac crest and should not cause an elevated respiratory rate. A low-grade fever is not considered a complication.

## Chapter 22- Disorders of Hemostasis

1. A hospital laboratory technologist is analyzing the complete blood count (CBC) of a patient. Which of the following statements best reflects an aspect of the platelets that would constitute part of the CBC?

A) Platelets originate with granulocyte colony-forming units (CFU).  
B) The half-life of a platelet is typically around 8 to 12 days.  
C) The  $\alpha$ -granules of platelets contribute primarily to vasoconstriction.  
D) New platelets are released from the bone marrow into circulation.

Ans: B

**Feedback:**

Platelets' half-life is typically around 8 to 12 days. They originate from megakaryocytes, and  $\delta$ -granules facilitate vasoconstriction. New platelets are released from the spleen into circulation.

2. A 71-year-old male patient with a history of myocardial infarction (MI) and peripheral vascular disease (PVD) has been advised by his family physician to begin taking 81 mg aspirin once daily. Which of the following statements best captures an aspect of the underlying rationale for the physician's suggestion?

A) Platelet aggregation can be precluded through inhibition of prostaglandin production by aspirin.  
B) Aspirin helps to inhibit ADP action and minimizes platelet plug formation.  
C) Aspirin can reduce unwanted platelet adhesion by inhibiting  $TXA_2$  synthesis.  
D) Aspirin inhibits the conversion of fibrinogen into fibrin and consequent platelet plug formation.

Ans: A

**Feedback:**

Aspirin prevents platelet plug formation by inhibiting synthesis of prostaglandins that mediate clot formation. Aspirin does not influence ADP,  $TXA_2$  synthesis, or fibrinogen conversion.

3. A hospital client is receiving intravenous infusion of heparin for treatment of a pulmonary embolus. Which of the following phenomena is most likely to occur, resulting in the drug's therapeutic effect?

A) Inhibition of vitamin K synthesis in the liver  
B) Suppression of fibrin formation  
C) Deactivation of the intrinsic clotting pathway  
D) Inhibition of ADP-induced platelet aggregation

Ans: B

**Feedback:**

Ultimately, heparin inhibits the clotting factors that mediate the formation of fibrin. It does not inhibit vitamin K synthesis, nor does it deactivate the intrinsic clotting pathway in particular. Heparin does not act on platelet plug formation.

4. When discussing the sequence of clot dissolution, the science instructor will talk about which item that begins the process?

A) Plasminogen  
B) Dabigatran  
C) Platelets  
D)  $\alpha_2$ -plasmin inhibitor

Ans: A

**Feedback:**

As with clot formation, clot dissolution requires a sequence of steps controlled by activators and inhibitors. Plasminogen, the proenzyme for the fibrinolytic process, normally is present in the blood in its inactive form. It is converted to its active form, plasmin, by plasminogen activators formed in the vascular endothelium, liver, and kidneys. Dabigatran is an anticoagulant. Platelets actually help cells stick together or adhere.

5. In which of the following patients, would diagnostic investigations least likely reveal increased thrombopoietin production?

A) An 81-year-old woman with diagnoses of rheumatoid arthritis and failure to thrive  
B) A 55-year-old man with dehydration secondary to Crohn disease  
C) A 66-year-old woman with a diagnosis of lung cancer with bone metastases  
D) A 21-year-old woman awaiting bone marrow transplant for myelogenous leukemia

Ans: D

**Feedback:**

Diseases such as myelogenous leukemia and other cases of *primary* thrombocytosis result in abnormalities in the thrombopoietin receptor and platelet binding. Cases of secondary thrombocytosis have an etiology rooted in increased thrombopoietin production. The common underlying causes of secondary thrombocytosis include tissue damage due to surgery, infection, cancer, and chronic inflammatory conditions such as rheumatoid arthritis and Crohn disease.

6. A 44-year-old Caucasian woman is being treated in an airport infirmary after she developed a painful, swollen leg during a transatlantic flight in economy class. The woman is suspected of having deep vein thrombosis (DVT) and is questioning the paramedics about why this might be the case, given that she has twice previously had similar experiences. Which of the following teaching points by the airport medical staff would be most appropriate?
- A) "A lot of Caucasian people have a genetic mutation that causes platelets to stick to their blood vessel walls."
  - B) "There is a genetic disorder that causes many Caucasians to form more clots in their blood vessels."
  - C) "A lot of Caucasians have an inherited inability to dissolve clots that form in their bodies."
  - D) "Your doctor might be able to tell you if you've inherited a predisposition to bleeding in your veins."

Ans: C

**Feedback:**

All of the listed responses refer to the Leiden mutation, which is best characterized as an inhibition of normal clot dissolution due to factor V defects. It does not involve platelet aggregation or adhesion or excess bleeding. It is better characterized as decreased clot dissolution rather than increased clot formation.

7. A medical student is familiarizing herself with recent overnight admissions to an acute medical unit of a university hospital. Which of the following patients would the student recognize as least likely to have a diagnosis of antiphospholipid syndrome in his or her medical history?
- A) A 66-year-old obese male with left-sided hemiplegia secondary to a cerebrovascular accident
  - B) A 90-year-old female resident of a long-term care facility who has been experiencing transient ischemic attacks
  - C) A 30-year-old female with a diagnosis of left leg deep vein thrombosis and a pulmonary embolism
  - D) A 21-year-old male with a diagnosis of cellulitis and suspected endocarditis secondary to intravenous drug use

Ans: D

**Feedback:**

Stroke, transient ischemic attacks, deep vein thrombosis, and pulmonary emboli are all common manifestations of the hypercoagulability associated with antiphospholipid syndrome. Cellulitis, endocarditis, and other infectious processes are less likely to be correlated with antiphospholipid syndrome.

8. A 36-year-old woman with a diagnosis of antiphospholipid syndrome is receiving a scheduled checkup from her nurse practitioner. Which of the following teaching points would the nurse most likely prioritize?
- A) "It's important for you to do regular physical activity and maintain a healthy body weight."
  - B) "Good nutrition and blood sugar control are important in your case."
  - C) "You'll need to avoid taking nonsteroidal anti-inflammatory drugs when you have menstrual cramps."
  - D) "You need to ensure your birth control pills don't contain estrogen."

Ans: D

**Feedback:**

Estrogen-containing birth control pills can predispose individuals with antiphospholipid syndrome to a thrombotic event. Exercise, nutrition, and blood sugar control are not particularly associated with management of antiphospholipid syndrome, and nonsteroidal anti-inflammatory drugs have no noted relevance to the disease.

9. A patient asks the health care provider why his lower legs look purple. The health care provider will base her response on which pathophysiological principle?
- A) Too much trauma breaks capillaries, and they bleed into the tissue.
  - B) The bruising around the ankles is due to the fact that it is a dependent area where the capillary pressure is higher.
  - C) There is a problem with his plasminogen levels.
  - D) Morbid obesity causes veins to enlarge and bleed into tissues due to stress the abdomen is placing on the vascular system.

Ans: B

**Feedback:**

Cutaneous bleeding is seen as pinpoint hemorrhages and purple areas of bruising in dependent areas where the capillary pressure is higher. There is no indication that the patient has experienced trauma to the area or is morbidly obese. Plasminogen helps with clot dissolution.



10. A surgeon is explaining to the parents of a 6-year-old boy the rationale for the suggestion of removing the boy's spleen. Which of the following teaching points would be most accurate?
- A) "We believe that your son's spleen is causing the destruction of many of his blood platelets, putting him at a bleeding risk."
  - B) "Your son's spleen is inappropriately filtering out the platelets from his blood and keeping them from normal circulation."
  - C) "Your son's spleen is holding on to too many of his platelets, so they're not available for clotting."
  - D) "We think that his spleen is inhibiting the production of platelets by his bone marrow."

Ans: C

**Feedback:**

A cause of thrombocytopenia is excessive sequestering of platelets by the spleen, necessitating splenectomy. The spleen would not be involved in destroying platelets, filtering them out from existing circulation, or inhibiting their production.

11. While being on subcutaneous heparin injections for deep vein thrombosis during her latter pregnancy, a patient begins to experience major side effects. Her OB-GYN physician has called in a specialist who thinks that the patient is experiencing heparin-induced thrombocytopenia. The nurse should anticipate which of the following orders?
- A) Decrease the dose of heparin from 5000 units b.i.d to 3000 units b.i.d
  - B) Immediately discontinue the heparin therapy
  - C) Switch to Coumadin 2.5 mg once/day
  - D) Infuse FFP stat

Ans: B

**Feedback:**

The treatment of HIT requires the immediate discontinuation of heparin therapy and the use of alternative anticoagulants to prevent thrombosis recurrence. Decreasing the dose will not stop HIT. Coumadin is contraindicated in pregnancy. FFP is not called for in this situation.

12. Following a course of measles, a 5-year-old girl developed scattered bruising over numerous body surfaces and was diagnosed with immune thrombocytopenic purpura (ITP). As part of her diagnostic workup, blood work was performed. Which of the following results is most likely to be considered unexpected by the health care team?

A) Increased thrombopoietin levels  
B) Decreased platelet count  
C) Normal vitamin K levels  
D) Normal leukocyte levels

Ans: A

**Feedback:**

In ITP, thrombopoietin levels are not elevated. Platelet levels would be expected to be low, and vitamin K and leukocyte levels would be unlikely abnormal.

13. Two nursing students are attempting to differentiate between the presentations of immune thrombocytopenic purpura (ITP) and thrombotic thrombocytopenic purpura (TTP). Which of the students' following statements best captures an aspect of the two health problems?

A) "Both diseases can result from inadequate production of thrombopoietin by megakaryocytes."  
B) "ITP can be either inherited or acquired, and if it's acquired, it involves an enzyme deficiency."  
C) "Both of them involve low platelet counts, but in TTP, there can be more, not less, hemostasis."  
D) "TTP can be treated with plasmapheresis, but ITP is best addressed with transfusion of fresh frozen plasma."

Ans: C

**Feedback:**

TTP is marked by sudden and severe thrombotic involvement. Neither disease has an etiology of low thrombopoietin production, and TTP, not ITP, is rooted in an enzyme deficiency. ITP is normally treated with corticosteroids and/or immunoglobulins.

14. Misinterpreting her physician's instructions, a 69-year-old woman with a history of peripheral artery disease has been taking two 325 mg tablets of aspirin daily. How has this most likely affected her hemostatic status?
- A) Irreversible acetylation of platelet cyclooxygenase activity has occurred.
  - B) The patient's prostaglandin (TXA<sub>2</sub>) levels are abnormally high.
  - C) She is at risk of developing secondary immune thrombocytopenic purpura (ITP).
  - D) The binding of an antibody to platelet factor IV produces immune complexes.

Ans: A

**Feedback:**

Aspirin can cause inhibition of platelet aggregation that lasts for the life of the platelet. High TXA<sub>2</sub> levels would be associated with increased coagulability. ITP would not result from aspirin intake, and binding of an antibody to platelet factor IV is associated with heparin-induced thrombocytopenia.

15. Which of the following teaching points would be most appropriate with a client who has a recent diagnosis of von Willebrand disease?
- A) "It's important that you avoid trauma."
  - B) "Your disease affects your platelet function rather than clot formation."
  - C) "Make sure that you avoid taking aspirin."
  - D) "Clotting factor VIII can help your body compensate for the difficulty in clotting."

Ans: C

**Feedback:**

No treatment other than the avoidance of aspirin is normally needed in the case of von Willebrand disease. Avoiding trauma and factor VIII therapy apply to hemophilia. Von Willebrand disease involves both the platelet and coagulation systems.

16. The school nurse knows several children with hemophilia A. After recess, one student with hemophilia comes to the school nurse complaining of pain in his knee from falling on the playground. The nurse notes there is swelling in the knee and pain on palpation. The nurse should
- A) administer some NSAIDs to relieve the pain.
  - B) wrap the knee in an ace bandage for compression.
  - C) apply some warm compresses to the knee.
  - D) notify parents to pick up the child and possibly administer factor VIII.

Ans: D

**Feedback:**

Prevention of trauma is important. ASA and other NSAIDs that affect platelet function should be avoided. Factor VIII replacement therapy administered at home has reduced the typical musculoskeletal damage. Wrapping with a bandage will not prevent damage. Warm compression will extend the bleed.

17. A 44-year-old female patient presents to the emergency department with abnormal bleeding and abdominal pain that is later attributed to gallbladder disease. Which of the following diagnoses would the medical team be most justified in suspecting as a cause of the patient's bleeding?
- A) Excess calcium
  - B) Vitamin K deficiency
  - C) Hemophilia B
  - D) Idiopathic immune thrombocytopenic purpura (ITP)

Ans: B

**Feedback:**

Factors VII, IX, and X and prothrombin require the presence of vitamin K for normal activity. Vitamin K deficiency may result from impaired fat absorption caused by liver or gallbladder disease. Calcium, factors X and V, and platelet phospholipids combine to form prothrombin activator, which then converts prothrombin to thrombin. Excess calcium could result in increased formation of blood clots. Hemophilia B is a hereditary disorder. Half of the cases of ITP occur as an acute disorder in children; ITP in adults is a chronic disorder with insidious onset.

18. Which of the following patients would be at risk for developing nonthrombocytopenic purpura? Select all that apply.

- A) A child adopted from India and displaying malaise, lethargy, and petechiae all over the body
- B) A 73-year-old patient admitted with concussion that resulted from a fall
- C) A 55-year-old patient diagnosed with Cushing disease displaying bruises, weight gain with a buffalo hump, and moon face
- D) A 15-year-old insulin-dependent diabetic with hypoglycemia displaying irritability with headaches and tachycardia
- E) A pregnant mother experiencing headaches and proteinuria

Ans: A, C

**Feedback:**

Vascular disorders that cause bleeding include vitamin C deficiency (answer A), Cushing disease (answer C), senile purpura, and aging process. Answers B and D do not result in weak vessel walls initially. Pregnant mother experiencing headaches and proteinuria is associated with preeclampsia.

19. A 30-year-old woman who has given birth 12 hours prior is displaying signs and symptoms of disseminated intravascular coagulation (DIC). The client's husband is confused as to why a disease of coagulation can result in bleeding. Which of the nurse's following statements best characterizes DIC?
- A) "So much clotting takes place that there are no available clotting components left, and bleeding ensues."
  - B) "Massive clotting causes irritation, friction, and bleeding in the small blood vessels."
  - C) "Excessive activation of clotting causes an overload of vital organs, resulting in bleeding."
  - D) "The same hormones and bacteria that cause clotting also cause bleeding."

Ans: A

**Feedback:**

DIC hemorrhage results from an insufficiency of clotting proteins after large-scale coagulation. It is not a result of physical irritation, organ overload, or bacteria and hormones.

20. A newly diagnosed leukemia patient begins hemorrhaging from every orifice. The physician is concerned that the patient has developed disseminated intravascular coagulation (DIC). The nurse should anticipate which of the following orders to be prescribed for this patient? Select all that apply.
- A) Transfuse 2 units of platelets.
  - B) Transfuse fresh frozen plasma.
  - C) Give aspirin twice per day.
  - D) Administer IV Toradol stat.
  - E) Place in reverse isolation.

Ans: A, B

**Feedback:**

The treatment of DIC is directed toward managing the primary disease, replacing clotting components, and preventing further activation of clotting mechanisms. Transfusions of FFP, platelets, or fibrinogen-containing cryoprecipitate may correct the clotting factor deficiency. ASA would make the bleeding worse. Toradol is an NSAID and should be avoided in patients with a bleeding problem. Reverse isolation is implemented for patients with pancytopenia.

## Chapter 23- Disorders of Red Blood Cells

1. A surgeon is explaining to the parents of a 6-year-old boy the rationale for the suggestion of removing the boy's spleen. Which of the following teaching points would be most accurate?
- A) "Ferritin is the activated and usable form of iron that your red blood cells can use to transport oxygen."
  - B) "Ferritin is a stored form of iron that indirectly shows me whether you would benefit from iron pills."
  - C) "Ferritin is a protein-iron complex that allows your red blood cells to make use of the iron that you consume in your diet."
  - D) "Ferritin is the form of iron that is transported in your blood plasma to red blood cells that need it."

Ans: B

**Feedback:**

Ferritin is the protein-iron complex that is stored in tissues, especially the liver, and the serum levels can be used as an indicator of the need for iron supplements. It is not accurately characterized as an activated form of iron, nor does it mediate the actual use of iron by erythrocytes. Transferrin, not ferritin, is transported in plasma, and it is associated with iron storage.

2. A 62-year-old female with a diagnosis of acute and chronic renal failure secondary to diabetes mellitus is receiving her weekly injection of epoetin, a supplementary form of erythropoietin. Which of the following statements best captures the necessity of this medication?
- A) Erythropoietin is needed in order for stem cells to proliferate into committed erythroid precursors.
  - B) Erythropoietin is necessary for the accurate sensation of hypoxia that stimulates erythropoiesis.
  - C) Erythropoietin causes the erythrocyte colony-forming units to proliferate and mature.
  - D) Erythropoietin facilitates the extrusion of the reticulocyte nucleus and the formation of true erythrocytes.

Ans: C

**Feedback:**

Erythropoietin acts primarily in later stages of erythropoiesis to induce the erythrocyte colony-forming units to proliferate and mature through the normoblast stage into reticulocytes and mature erythrocytes. It does not act directly on the stem cells, nor does it play a role in the sensation of hypoxia. Reticulocytes already lack a cell nucleus.

3. A client with a diagnosis of hemolytic anemia has gone to a community-based laboratory for follow-up blood work. The lab technician confirms with the client that hematocrit is one of the components of the blood work. The client replies, "I thought the point of the blood work was to see how many red blood cells I have today." How could the technician best respond to the client's statement?
- A) "This result will tell your care provider about the number of red blood cells in a given quantity of your blood plasma."
  - B) "Your hematocrit measures the average size of your red blood cells and indirectly measures your oxygen-carrying capacity."
  - C) "The result will indicate how many of your red blood cells are new and young and will indicate your body's production rate of red cells."
  - D) "The hematocrit measures the mass that your red blood cells account for in a quantity of your blood."

Ans: D

**Feedback:**

Hematocrit measures the mass of erythrocytes in a given quantity of blood plasma. It does not measure the number of red cells, their size, or their production rate and age.

4. A client with a gastrointestinal bleed secondary to alcohol abuse and a hemoglobin level of 5.8 g/dL has been ordered a transfusion of packed red blood cells. The client possesses type B antibodies but lacks type D antigens on his red cells. Transfusion of which of the following blood types would be least likely to produce a transfusion reaction?
- A) B<sup>-</sup>
  - B) B<sup>+</sup>
  - C) A<sup>+</sup>
  - D) A<sup>-</sup>

Ans: D

**Feedback:**

The client's blood type is A<sup>-</sup> and would necessitate A<sup>-</sup> or O<sup>-</sup> donor blood. Other types would induce a transfusion reaction.

5. Your ESRD patient is receiving 2 units of packed red blood cells for anemia (Hgb of 8.2). Twenty minutes into the first transfusion, the nurse observes the patient has a flushed face, hives over upper body trunk, and is complaining of pain in lower back. His vital signs include pulse rate of 110 and BP drop to 95/56. What is the nurse's priority action?
- A) Slow the rate of the blood infusion to 50 mL/hour.
  - B) Document the assessment as the only action.
  - C) Discontinue the transfusion and begin an infusion of normal saline.
  - D) Recheck the type of blood infusing with the chart documentation of patient's blood type.

Ans: C

**Feedback:**

An immediate hemolytic reaction usually is caused by ABO incompatibility. The signs include flushing of the face, urticaria (hives), headache, pain in the lumbar area, chills, fever, chest pain, tachycardia, hypotension, and dyspnea. If any of these actions occur, the transfusion should be stopped immediately. Access to a vein should be maintained because it may be necessary to infuse IV solutions to ensure diuresis. Slowing the rate of the blood infusion will not correct this hemolytic reaction and will only worsen the patient's condition. Of course, documentation after the above interventions are performed is vital. Rechecking the blood type infusing will not stop the hemolytic reaction. After corrective actions/interventions are taken, the blood bag is returned to the blood bank for further testing.

6. A 66-year-old female patient has presented to the emergency department because of several months of intermittently bloody stool that has recently become worse. The woman has since been diagnosed with a gastrointestinal bleed secondary to overuse of nonsteroidal anti-inflammatory drugs that she takes for her arthritis. The health care team would realize that which of the following situations is most likely to occur?
- A) The woman has depleted blood volume due to her ongoing blood loss.
  - B) She will have iron deficiency anemia due to depletion of iron stores.
  - C) The patient will be at risk for cardiovascular collapse or shock.
  - D) She will have delayed reticulocyte release.

Ans: B

**Feedback:**

Ongoing blood loss is associated with iron deficiency anemia due to the depletion of iron stores. She is unlikely to have a depleted blood volume or be at risk for shock, situations more commonly associated with traumatic, sudden blood loss. There would not likely be a delay in the release of reticulocytes.



7. Amniocentesis has suggested that a couple's first child will be born with sickle cell disease. The parents are unfamiliar with the health problem, and their caregiver is explaining the complexities. Which of the following statements by the parents would suggest a need for further teaching or clarification?
- A) "Our baby's red cells are prone to early destruction because of his or her weak membranes."
  - B) "Not all of his or her red cells will be sickled, but low oxygen levels can cause them to become so."
  - C) "Sickled cells can block his or her blood vessels, especially in the abdomen, chest, and bones."
  - D) "Our son or daughter likely won't show the effects of sickling until he or she is school-aged because of the different hemoglobin in babies."

Ans: D

**Feedback:**

Fetal hemoglobin in the infant is replaced by 8 or 10 weeks of age, and manifestations of sickle cell disease can begin at this time. Answer choices A, B, and C all convey the aspects of sickle cell disease.

8. A child has been diagnosed with thalassemia. Which of the following comorbidities may occur as a result of having thalassemia?
- A) Hypocoagulation
  - B) Iron deficiency
  - C) Splenomegaly
  - D) Neutropenia

Ans: C

**Feedback:**

Thalassemia can result in enlargement of the spleen and liver due to increased hematopoiesis and red cell destruction. It is associated with thrombotic events, not hypocoagulation, as well as iron excess. Neutropenia is not associated with thalassemia.

9. A patient has been diagnosed with anemia. The physician suspects an immune hemolytic anemia and orders a Coombs test. The patient asks the nurse what this test will tell the doctor. The nurse replies,
- A) "They will wash your RBCs and then mix the cells with a reagent to see if they clump together."
  - B) "They will look at your RBCs under a microscope to see if they have an irregular shape (poikilocytosis)."
  - C) "They will be looking to see if you have enough ferritin in your blood."
  - D) "They are looking for the presence of antibody or complement on the surface of the RBC."

Ans: D

**Feedback:**

The Coombs test is used to diagnose immune hemolytic anemias. It detects the presence of antibody or complement on the surface of the red cell. Answer choice A refers to direct antiglobulin test (DAT). Answer choice B refers to blood smear test. Answer choice C refers to iron stores test.

10. A 13-year-old African American boy comes to the ER complaining of fatigue and a rapid heartbeat. In conversation with the father, it becomes apparent to you that the boy has grown 2 inches in the previous 5 months. What is the first problem the health care team would attempt to rule out?
- A) Sickle cell anemia
  - B) Iron deficiency anemia
  - C) Thalassemia
  - D) Aplastic anemia

Ans: B

**Feedback:**

Although each of the above answers is associated with fatigue and rapid heartbeat, male adolescents are particularly susceptible to iron deficiency anemia. They have high iron requirements because of growth spurts and dietary deficiencies.

11. A 22-year-old female who adheres to a vegan diet has been diagnosed with iron deficiency anemia. Which of the following components of her diagnostic blood work would be most likely to necessitate further investigation?
- A) Decreased mean corpuscular volume (MCV)
  - B) Decreased hemoglobin and hematocrit
  - C) Microcytic, hypochromic red cells
  - D) Decreased erythropoietin levels

Ans: D

**Feedback:**

It would be unusual to note decreased levels of erythropoietin concurrent with a diagnosis of anemia. Decreased MCV, hematocrit, and hemoglobin are congruent with the diagnosis, as are microcytic, hypochromic erythrocytes.

12. A community health nurse is conducting a class on the nutritional component for new mothers. Which of the following teaching points would be most justified?
- A) "Iron supplementation is not necessary provided you are breast-feeding your infant."
  - B) "Be aware that cow's milk depletes your baby's supply of iron."
  - C) "Your infant needs the same amount of iron as you but has far fewer sources for obtaining it."
  - D) "If you choose to feed your baby with formula, ensure that it is iron fortified."

Ans: D

**Feedback:**

Formula and cereals for infants should be iron fortified to preclude iron deficiency anemia. Breast-feeding does not necessarily mitigate the need for iron supplementation, and cow's milk does not deplete existing iron stores but fails to provide sufficient levels of absorbable iron. Infants and children have significantly higher iron needs than do adults.

13. A client with a diagnosis of atrophic gastritis and consequent pernicious anemia is receiving high oral doses of vitamin B<sub>12</sub>. Which of the following changes would be most likely expected by his care provider at the completion of his treatment?
- A) Decreased mean corpuscular volume
  - B) Increased serum bilirubin
  - C) Increased folic acid levels
  - D) Decreased free heme levels

Ans: A

**Feedback:**

Increased red cell size is associated with vitamin B<sub>12</sub> deficiency, and MCV would decrease with treatment. Increased bilirubin and folic acid levels would not be associated with resolution of pernicious anemia, and heme is not normally present or measured in a free circulatory form.

14. Two years after chemotherapy and radiation therapy for lung cancer, a 72-year-old patient notices that he seems to be extremely tired all the time. The physician suspects the patient may have developed aplastic anemia. The nurse assessing the patient will likely find which of the following clinical manifestations of aplastic anemia? Select all that apply.

- A) Complaints of weakness and fatigue
- B) Small spots of skin hemorrhages over the entire body
- C) Excess bleeding from gums and nose
- D) Spoon-shaped deformity of the fingernails
- E) Hemolysis from renal dialysis treatments.

Ans: A, B, C

**Feedback:**

The onset of aplastic anemia may be insidious or sudden. The initial presenting symptoms include weakness, fatigue, and pallor caused by the anemia. Petechiae and ecchymoses often occur on the skin, and bleeding from the nose, gums, vagina, or GI tract may occur due to decreased platelet levels. Spoon-shaped deformity of the fingernails is seen in iron deficiency anemia. Hemolysis and blood loss from renal dialysis treatments contribute to anemia associated with a deficiency of erythropoietin (which is normally produced in the kidneys).

15. Which of the following patients would be most likely to be experiencing an increase in renal erythropoietin production?
- A) A 71-year-old smoker admitted to hospital with exacerbation of his chronic obstructive pulmonary disease (COPD)
  - B) A 70-year-old woman admitted with dehydration secondary to an overdose of her potassium-wasting diuretic
  - C) A 68-year-old man with a long-standing diagnosis of polycythemia vera
  - D) A 21-year-old man with acute blood loss secondary to a motor vehicle accident 3 hours prior

Ans: A

**Feedback:**

Increases in erythropoietin production are associated with secondary polycythemia, and not polycythemia vera, a health problem that can be induced by the hypoxia resulting from smoking and lung disease. Dehydration is associated with relative polycythemia, and sudden blood loss would not manifest in increased erythropoietin production.

16. A 53-year-old man presents with inability to concentrate, itching in his fingers and toes, elevated blood pressure, and unexplained weight loss. He is diagnosed with primary polycythemia. What will be the primary goal of his treatment?

- A) To control his hypertension
- B) To increase the amount of oxygen distributed by his red blood cells
- C) To reduce the mean size of his red cells
- D) To reduce the viscosity of his blood

Ans: D

**Feedback:**

While hypertension may accompany polycythemia vera, the primary goal of treatment is to control the increase in blood viscosity that accompanies the disease. Polycythemia vera is not associated with increased corpuscular volume, and oxygen distribution is not a priority problem.

17. A new mother and father are upset that their 2-day-old infant is requiring phototherapy for hyperbilirubinemia. The pediatrician who has followed the infant since birth is explaining the multiplicity of factors that can contribute to high serum bilirubin levels in neonates. Which of the following factors would the physician be most likely to rule out as a contributor?

- A) The fact that the infant is being breast-fed
- B) Hypoxia
- C) Hepatic immaturity of the infant
- D) Transitioning of hemoglobin F (HbF) to hemoglobin A (HbA)

Ans: D

**Feedback:**

Hemoglobin transition from HbF to HbA is not associated with hyperbilirubinemia. Breast-feeding, hypoxia, and immaturity of the young liver can contribute to hyperbilirubinemia.

18. Which of the following nursing interventions would be a priority when caring for a newborn who is receiving phototherapy for high bilirubin levels? Select all that apply.
- A) Frequent monitoring of temperature
  - B) Keeping diapers dry and clean
  - C) Maintaining oral intake to prevent dehydration
  - D) Putting lotion on his skin frequently to prevent drying/cracking of skin
  - E) Applying sunscreen to prevent ultraviolet radiation

Ans: A, C

**Feedback:**

Effective treatment depends on the area of skin exposed and the infant's ability to metabolize and excrete bilirubin. Frequent monitoring of bilirubin levels, body temperature, and hydration is critical to the infant's care. Diapers are usually not worn when under phototherapy light (want to keep the skin exposed to the light). Applying lotion and sunscreen would result in possible burning of the infant's skin while under the light.

19. If an Rh-negative mother is giving birth to an Rh-positive infant, the nurse should be prepared to administer
- A) antihistamines like Benadryl.
  - B) alpha interferon.
  - C) Rh immune globulin.
  - D) a monoclonal antibody like infliximab.

Ans: C

**Feedback:**

The injection of Rh immune globulin prevents sensitization in Rh-negative mothers who have given birth to Rh-positive infants if administered at 28 weeks' gestation and within 72 hours of delivery, abortion, or genetic amniocentesis. Antihistamines, alpha-interferon, or infliximab is not used in this situation.

20. The family members of an elderly patient are wondering why his “blood counts” are not rising after his last GI bleed. They state, “He has always bounced back after one of these episodes, but this time it isn't happening. Do you know why?” The nurse will respond based on which of the following pathophysiological principles?

- A) “Everything slows down when you get older. You just have to wait and see what happens.”
- B) “Due to stress, the red blood cells of older adults are not replaced as promptly as younger people.”
- C) “The doctor may start looking for another cause of his anemia, maybe cancer of the bone.”
- D) “Don't worry about it. We can always give him more blood.”

Ans: B

**Feedback:**

In older adults, the number of progenitor cells declines. During a stress situation such as bleeding, the red blood cells of older adults are not replaced as promptly as those of their younger counterparts. Given the scenario, the patient is obviously bleeding from the GI tract. There is no reason to suspect the patient has bone cancer. Answer choice D is a nontherapeutic communication technique. The nurse is trying to pacify the family and not really addressing their concern.

## Chapter 24- Disorders of White Blood Cells and Lymphoid Tissues

1. Which of the following glycoproteins is responsible for treating such diseases as bone marrow failure following chemotherapy and hematopoietic neoplasms such as leukemia?
  - A) Growth factors and cytokines
  - B) Neutrophils and eosinophils
  - C) T lymphocytes and natural killer cells
  - D) Natural killer cells and granulocytes

Ans: A

**Feedback:**

The identification and characterization of the various growth factors and cytokines have led to their use in treating a wide range of diseases like bone marrow failure, hematopoietic neoplasms, infectious diseases, and congenital and myeloproliferative disorders. Neutrophils are primarily responsible for maintaining normal host defenses against invading bacteria, cell debris, or foreign substances. Eosinophils increase in number during allergic reactions and parasitic infections. T lymphocytes are involved in cell-mediated immunity. Natural killer cells participate in innate or natural immunity, and their function is to destroy foreign cells. Granulocytes are phagocytic cells.

2. A 12-year-old boy has contracted a bacterial infection at school, and his body has responded by increasing leukocyte production. Place the following components of white blood cell production in the correct chronological order. Use all the options.
  - A) Myeloblast
  - B) Promyelocyte
  - C) Myeloid stem cell
  - D) Metamyelocyte
  - E) Neutrophil

Ans: C, A, B, D, E

**Feedback:**

Granulocytes like neutrophils derive from the myeloid stem cells. The immature precursor cells for each of the cell lines are called blast cells. Myeloblasts, which are the granulocytic precursor cells, have round to oval nuclei, with delicate chromatin and a blue to gray cytoplasm. During the next stage of development, the myeloblasts are transformed into promyelocytes with similar nuclei, but with a cytoplasm containing many primary granules. In the subsequent metamyelocyte stage, the nuclei distort and become arclike, producing the band developmental stage. Metamyelocytes mature into neutrophils.



3. Which of the following statements most accurately conveys an aspect of lymphatic system activity?
- A) B- and T-lymphocyte development begins in the bone marrow and ends in the peripheral lymphoid structures.
  - B) B cells and macrophages are released from the bone marrow in their completed state.
  - C) Stem cells in the lymph nodes initiate and regulate the process of white cell synthesis.
  - D) Leukocytes bypass vascular circulation and are distributed instead by the lymphatic system.

Ans: A

**Feedback:**

While both precursor B and T lymphocytes begin their development in the bone marrow, they migrate to peripheral lymphoid structures to complete the differentiation process. Stem cells are not located in the lymph nodes, and circulation of white cells is not exclusive to the lymphatic circulatory system.

4. A 44-year-old male hospital client with a diagnosis of end-stage acquired immunodeficiency syndrome (AIDS) has been placed on neutropenic precautions that limit his interaction with visitors, staff, and other clients. What is the underlying rationale for these precautions?
- A) His antibody-mediated immunity is compromised by his low production of neutrophils.
  - B) Neutropenia limits the ability of his CD4 helper cells to present antigens.
  - C) Insufficient levels of neutrophils make him particularly susceptible to infections.
  - D) Cyclic neutropenia limits his body's ability to fight various infections.

Ans: C

**Feedback:**

A decrease in the number of neutrophils places an individual at risk for infection. Neutrophils are not directly involved in the antibody-mediated immune process, and his neutropenia is infection related, not cyclic.

5. Which of the following patients has an absolute neutrophil count that is critically low and that the standard of care would recommend they be placed on neutropenic precautions?
- A) A patient on long-term steroids for rheumatoid arthritis with WBC of 7000
  - B) A 37-year-old patient with leukemia being treated with chemotherapy with ANC of 400
  - C) A 65-year-old prostate cancer patient receiving radiation therapy with neutrophil count of 2000
  - D) A 75-year-old renal failure patient receiving Epogen for anemia with hemoglobin level of 9.7.

Ans: B

**Feedback:**

Neutrophils constitute the majority of blood leukocytes and play a critical role in host defense mechanisms against infections. The ANC is supposed to be  $1000/\mu\text{L}$ , and if the ANC is less than  $500 \text{ cells}/\text{mm}^3$ , the person is generally put on neutropenic precautions in the hospital to protect him or her from the environment. A patient on long-term steroids for rheumatoid arthritis with WBC of 7000 has a normal WBC count; a prostate cancer patient receiving radiation therapy with neutrophil count of 2000 has a normal neutrophil count; a renal failure patient receiving Epogen for anemia with hemoglobin level of 9.7 is associated with RBCs and not neutrophils.

6. A patient with rheumatoid arthritis has been diagnosed with a secondary immune-associated neutropenia called Felty syndrome. The nurse has had to research this and found that she should be assessing this patient for which of the following manifestations of Felty syndrome. Select all that apply.
- A) Upper left quadrant pain on palpation
  - B) An area of diminished breath sounds related to pneumonia
  - C) Intermittent pain that radiates from the flank to the groin
  - D) Swelling and pain in all joints when put through full range of motion
  - E) Headache that worsens when exposed to bright lights

Ans: A, B

**Feedback:**

Felty syndrome, a variant of rheumatoid arthritis (RA), is a triad of splenomegaly (upper left quad pain), recurrent pulmonary infections (diminished breath sounds), and neutropenia. Intermittent pain that radiates from the flank to the groin is usually associated with kidney stone pain. Swelling and pain in all joints when put through full range of motion are also associated with rheumatoid arthritis.

7. A 14-year-old boy has been diagnosed with infectious mononucleosis. Which of the following pathophysiological phenomena is most responsible for his symptoms?
- A) The Epstein-Barr virus (EBV) is lysing many of the boy's neutrophils.
  - B) Viruses are killing some of his B cells and becoming incorporated into the genome of others.
  - C) The EBV inhibits the maturation of white cells within his peripheral lymph nodes.
  - D) The virus responsible for mononucleosis inhibits the maturation of myeloblasts into promyelocytes.

Ans: B

**Feedback:**

B lymphocytes all of which have receptors for the EBV that causes mononucleosis. Infection of the B cells may take one of two forms—it may kill the infected B cell, or it may become incorporated into its genome. Lysis of neutrophils or inhibition of white cell maturation or differentiation is not a central component of mononucleosis etiology.

8. A 16-year-old female has been brought to her primary care physician by her mother due to the girl's persistent sore throat and malaise. Which of the following facts revealed in the girl's history and examination would lead the physician to rule out infectious mononucleosis?
- A) The girl has a temperature of 38.1°C (100.6°F) and has enlarged lymph nodes.
  - B) Her liver and spleen are both enlarged.
  - C) Blood work reveals an increased white blood cell count.
  - D) Chest auscultation reveals crackles in her lower lung fields bilaterally.

Ans: D

**Feedback:**

While fever, enlarged lymph nodes, splenomegaly, hepatomegaly, and leukocytosis would suggest mononucleosis, adventitious lung sounds are not associated with the disease.

9. A 40-year-old male client is shocked to receive a diagnosis of mature B-cell lymphoma and is doing research on his diagnosis on the Internet. Which of the following statements that he reads on various Web sites is most reliable?
- A) "Like most forms of Hodgkin lymphoma, mature B-cell lymphoma often requires radiation treatment."
  - B) "Doctors are able to diagnose mature B-cell lymphoma by the presence of Reed-Sternberg cells."
  - C) "Unlike many other lymphomas, mature B-cell lymphoma is often self-limiting, and treatment is focused on symptoms."
  - D) "The lymph nodes are usually affected, and often the spleen and bone marrow."

Ans: D

**Feedback:**

The NHL subtypes of mature B-cell lymphoma may affect the lymph nodes, spleen, or bone marrow. It is not a type of Hodgkin lymphoma, and Reed-Sternberg cells would indicate Hodgkin lymphoma. It is not self-limiting and necessitates active treatment.

10. Which of the following statements by a client of a cancer center who has a new diagnosis of non-Hodgkin lymphoma (NHL) demonstrates a sound understanding of the diagnosis and treatment of the health problem?
- A) "They confirmed my diagnosis with a lymph node biopsy, and I'll get radiation treatment soon because it's fairly early stage."
  - B) "They took a sample of my lymph nodes, and I'll be having surgery soon that will hopefully cure my lymphoma."
  - C) "My blood work came back positive for NHL, and I'm meeting with my oncologist to discuss chemotherapy soon."
  - D) "Since the tests show NHL, I'm going to pursue my options for palliative care because I'm committed to dying with dignity."

Ans: A

**Feedback:**

Lymph node biopsy is often used to provide a diagnosis of NHL, and radiation is a common treatment, especially in early stages of the disease. Surgery is not a noted treatment modality, and while blood work may help with staging, it is not a common source of a confirming diagnosis. Treatment options do exist, and palliative care would be premature.

11. A patient has visited his physician because he found an enlarged lymph node along the mediastinal border. When questioned, the physician may be alerted to a possible diagnosis of Hodgkin lymphoma (HL) if the patient also displays: Select all that apply.
- A) yeast infection in the mouth.
  - B) night sweats.
  - C) unexplained pruritus.
  - D) joint swelling.
  - E) sore throat with pustules on tonsils.

Ans: B, C

**Feedback:**

Most people with HL present with painless enlargement of a single node or group of nodes. The initial lymph node involvement typically is above the level of the diaphragm. Mediastinal masses are frequent and discovered on routine chest x-ray. There may be complaints of chest discomfort with cough or dyspnea. Additional symptoms include fevers, chills, night sweats, and weight loss. Pruritus and intermittent fevers associated with night sweats are classic symptoms of HL. Yeast infections and joint swelling are not associated with HL. Sore throat with pustules on tonsils is associated with strep throat.

12. A 60-year-old woman is suspected of having non-Hodgkin lymphoma (NHL). Which of the following aspects of her condition would help to rule out Hodgkin lymphoma?
- A) Her neoplasm originates in secondary lymphoid structures.
  - B) The lymph nodes involved are located in a large number of locations in the lymphatic system.
  - C) The presence of Reed-Sternberg cells has been confirmed.
  - D) The woman complains of recent debilitating fatigue.

Ans: B

**Feedback:**

While NHLs tend to be multicentric, Hodgkin lymphoma tends to involve a single node or group of nodes. The presence of Reed-Sternberg cells would indicate Hodgkin lymphoma, and both NHL and Hodgkin lymphoma involve secondary lymphoid structures and would cause fatigue.

13. A group of nursing students were studying for their pathophysiology exam by quizzing each other about disorders of WBCs and lymphoid tissue. When asked what the first chromosomal abnormality that identified cancer was, one student correctly answered
- A) interleukin cells.
  - B) BRCA-1.
  - C) Philadelphia.
  - D) PSA.

Ans: C

**Feedback:**

One of the more studied translocations is the Philadelphia chromosome, which was the first chromosomal abnormality identified in cancer. Cytokines or chemical messengers, such as interleukin (IL)-1, IL-4, IL-6, and interferon, act synergistically to support the functions of the growth factors. BRCA is a genetic test for breast cancer testing. BRCA mutations place the female at risk for developing cancers of the breast and ovary; PSA stands for prostate-specific antigen. It is a protein produced by prostate cells and is utilized to screen for prostate cancer.

14. Which of the following assessments and laboratory findings would be most closely associated with acute leukemia?
- A) High blast cell counts and fever
  - B) Decreased oxygen partial pressure and weight loss
  - C) Increased serum potassium and sodium levels
  - D) Increased blood urea nitrogen and bone pain

Ans: A

**Feedback:**

Acute leukemia is often marked by a fever as well as leukostasis. Changes in oxygen saturation, electrolytes, and BUN would be less closely associated with ALL and AML.

15. Which of the following individuals would most likely possess normal plasma cell synthesis and fully differentiated myeloid and lymphoid cells?
- A) A 7-year-old boy with a diagnosis of acute lymphocytic leukemia (ALL)
  - B) A 70-year-old male who has acute myelogenous leukemia (AML)
  - C) A 58-year-old female with HIV and multiple myeloma
  - D) A 78-year-old male who has been diagnosed with chronic lymphocytic leukemia (CLL)

Ans: D

**Feedback:**

Chronic leukemia is associated with proliferation of myeloid and lymphoid cells that are better differentiated than in cases of acute leukemia. Multiple myeloma would denote abnormalities of the plasma cells.

16. A patient diagnosed with low-risk chronic lymphocytic leukemia (CLL) has recently developed thrombocytopenia. One of the medications utilized to treat this would be
- A) dexamethasone, a corticosteroid.
  - B) cisplatin, a chemotherapeutic.
  - C) vincristine, a *Vinca* alkaloid.
  - D) doxorubicin, a cytotoxic antibiotic.

Ans: A

**Feedback:**

Complications of CLL include thrombocytopenia and may require treatment with corticosteroids or splenectomy. None of the other medications are used for treatment of CLL.

17. A 70-year-old woman has received a diagnosis of chronic myelogenous leukemia (CML) after a clinical investigation sparked by the presence of leukocytosis in her routine blood work. What clinical course should her care provider tell her to expect?
- A) "You can expect your blood results, fatigue, and susceptibility to infection to gradually worsen over a few years."
  - B) "You could remain the chronic stage of CML for several years before it accelerates and culminates in a crisis."
  - C) "It's likely that this will give you chronic fatigue and malaise for the rest of your life, but that will probably be the extent of your symptoms."
  - D) "Unfortunately, your leukemia will likely enter a crisis mode within a few weeks if we don't treat it immediately."

Ans: B

**Feedback:**

The clinical course of CML is commonly divided into three phases: (1) a chronic phase of variable length, (2) a short accelerated phase, and (3) a terminal blast crisis phase. Persons in the early chronic phase of CML generally are asymptomatic, but without effective treatment, most will enter the accelerated phase within 4 years.

18. A 32-year-old woman presents at her neighborhood health clinic complaining of weakness and a feeling of abdominal fullness. She reports that 6 months earlier she noticed that she had difficulty in maintaining the high level of energy she has relied on during her aerobic workouts over the past few years. Because she felt that she was in overall good health, but knew that women often need additional iron, she added a multiple vitamin with iron and some meat and leafy greens to her diet. She followed her plan carefully but had no increase in energy. Upon examination, her spleen is noted to be enlarged. Which of the following is most likely to be the cause?

A) Accelerated CML  
B) Stage A Hodgkin disease  
C) Infectious mononucleosis  
D) CLL

Ans: A

**Feedback:**

Typically, CML follows a triphasic course: (1) a chronic phase of variable length, (2) a short accelerated phase, and (3) a terminal blast crisis phase. The onset of the chronic phase is usually slow with nonspecific symptoms. Anemia causes weakness, easy fatigability, and exertional dyspnea. The accelerated phase is characterized by enlargement of the spleen and progressive symptoms. Persons with Hodgkin disease are commonly designated as stage A if they lack constitutional symptoms and stage B if significant weight loss, fevers, pruritus, or night sweats are present. In cases of infectious mononucleosis, most persons seek medical attention for severe pharyngitis, which usually is most severe on days 5 through 7 and persists for a total of 7 to 14 days. CLL is mainly a disorder of older persons; fewer than 10% of those who develop the disease are younger than 50 years of age. Men are affected twice as often as women.



19. In which of the following individuals would a clinician most suspect multiple myeloma as a diagnosis?

- A) A 40-year-old man who has had three broken bones over the past 6 months and whose serum calcium and creatinine levels are elevated
- B) A 68-year-old former coal miner who has white cell levels exponentially higher than normal ranges
- C) An 81-year-old male resident of a long-term care home who has an uncommon bacterial pneumonia and who is unable to produce a fever
- D) A 70-year-old woman whose blood work reveals large numbers of immature granulocytes

Ans: A

**Feedback:**

The main sites involved in multiple myeloma are the bones and bone marrow. In addition to the abnormal proliferation of marrow plasma cells, there is proliferation and activation of osteoclasts that lead to bone resorption and destruction. This increased bone resorption predisposes the individual to pathologic fractures and hypercalcemia. Many patients also present with renal insufficiency. Leukostasis, susceptibility to infection, and disorders of granulocyte development are not hallmarks of multiple myeloma.

20. A 30-year-old male's blood work and biopsies indicate that he has proliferating osteoclasts that are producing large amounts of IgG. What is the man's most likely diagnosis?

- A) Acute myelogenous leukemia
- B) Multiple myeloma
- C) Acute lymphocytic leukemia
- D) Hodgkin lymphoma

Ans: B

**Feedback:**

One of the characteristics resulting from the proliferating osteoclasts in multiple myeloma is the unregulated production of a monoclonal antibody referred to as the M protein. In most cases, the M protein is either IgG or IgA. This phenomenon is not present in cases of CML, ALL, or Hodgkin lymphoma.

## Chapter 25- Structure and Function of the Cardiovascular System

1. As part of presurgical teaching for patients who are about to undergo a coronary artery bypass graft, a nurse is performing an education session with a group of surgical candidates. Which of the following teaching points best conveys an aspect of the human circulatory system?
  - A) "The blood pressure varies widely between arteries and veins and between pulmonary and systemic circulation."
  - B) "Only around one quarter of your blood is in your heart at any given time."
  - C) "Blood pressure and blood volume roughly mimic one another at any given location in the circulatory system."
  - D) "Left-sided and right-sided pumping action on each beat of the heart must equal each other to ensure adequate blood distribution."

Ans: A

**Feedback:**

There is a large variation between the higher pressure in the systemic circulatory system and arteries and the lower pressure in the pulmonary system and veins. Approximately 8% of the blood supply is in the heart at any given time. Blood pressure and blood volume are inversely proportionate. The body is able to accommodate short-term differences in left-sided and right-sided output.

2. In which of the following situations would blood most likely rapidly relocate from central circulation to the lower extremities?
  - A) A client undergoes a stress test on a treadmill.
  - B) A client does isotonic exercises in a wheelchair.
  - C) A client is helped out of bed and stands up.
  - D) A client reclines from a sitting to supine position.

Ans: C

**Feedback:**

During a change in body position, blood is rapidly relocated from the central circulation (when the patient is recumbent) to the lower extremities (when the patient stands up). This results in a temporary drop in blood pressure known as postural hypotension and reflects the redistribution of blood in the body.

3. Which of the following statements most accurately captures a principle of blood flow?
- A) With constant pressure, a small increase in vessel radius results in an exponential increase in blood flow.
  - B) Blood flow is primarily determined by blood viscosity and temperature.
  - C) Blood flows most quickly in the small diameter peripheral capillaries.
  - D) Smaller cross-sectional vessel area is associated with lower flow velocity.

Ans: A

**Feedback:**

Doubling the radius of a vessel is associated with a fourth-power increase in flow, provided pressure remains constant. Blood flow is primarily a function of blood pressure, resistance, and viscosity. The small size of capillaries is associated with quite slow velocity, given their large total combined cross-sectional area. Smaller cross-sectional area is associated with greater velocity.

4. A 72-year-old female has been told by her physician that she has a new heart murmur that requires her to go visit a cardiologist. Upon examination, the cardiologist informs the patient that she has aortic stenosis. After the cardiologist has left the room, the patient asks, "What caused this [aortic stenosis] to happen now?" The clinic nurse responds,
- A) "Heart murmurs result from tumultuous flow through a diseased heart valve that is too narrow and stiff. This flow causes a vibration called a murmur."
  - B) "Aortic stenosis is commonly seen in elderly patients. Basically, there is a blockage in the valve that is causing blood to pool, causing decreased velocity of flow."
  - C) "This is caused by a tear in one of the papillary muscles attached to the valve. They can do a procedure where they thread a catheter into the heart and reattach the muscle ends."
  - D) "Because of the high amount of energy it takes to push blood through the aortic valve to the body, your valve is just had to work too hard and it is weakening."

Ans: A

**Feedback:**

Heart murmur results from turbulent flow through a diseased heart valve that may be too narrow, too stiff, or too floppy. This turbulent flow causes a vibration called a murmur.

5. A physician is teaching a group of medical students about the physiological basis for damage to the circulatory and neurological systems that can accompany hypotension. Which of the following responses by a student would warrant correction by the physician?

A) "As vessel wall thickness increases, tension decreases."  
B) "Smaller blood vessels require more pressure to overcome wall tension."  
C) "The smaller the vessel radius, the greater the pressure needed to keep it open."  
D) "Tension and vessel thickness increase proportionately."

Ans: D

**Feedback:**

Tension and vessel wall thickness are inversely proportionate, in that thinner blood vessels have greater tension and vice versa. Answer choices A, B, and C all express the correct inverse relationship between tension and wall thickness.

6. During an automobile accident where the patient is bleeding heavily, which vascular component is the most distensible and can store large quantities of blood that can be returned to the circulation at this time of need?

A) Liver and pancreas  
B) Kidneys  
C) Veins  
D) Aorta

Ans: C

**Feedback:**

Compliance refers to the total quantity of blood that can be stored in a given portion of the circulation for each mm Hg rise in pressure. The most distensible of all vessels are the veins, which can increase their volume with only slight changes in pressure. This allows the veins to function as a reservoir for storing large quantities of blood that can be returned to the circulation when it is needed. The liver, pancreas, and kidneys are not vascular components.

7. A client has suffered damage to his pericardium following a motor vehicle accident. Which consequence could be a possible complication of damaged pericardium that his care providers should assess for?

A) Impaired physical restraint of the left ventricle  
B) Increased friction during the contraction/relaxation cycle  
C) Reduced protection from infectious organisms  
D) Impaired regulation of myocardial contraction

Ans: D

**Feedback:**

Regulation of myocardial contraction is not a role of the fibrous covering around the heart. The pericardium does restrain the left ventricle, reduce friction by way of fluid in the pericardial cavity, and provide a physical barrier to infection.

8. A pathologist is examining histological (tissue) samples from a client with an autoimmune disease. Which of the following characteristics of muscle samples would signal the pathologist that the samples are cardiac rather than skeletal muscle?
- A) The cell samples lack intercalated disks.
  - B) The muscle cells have small and a few mitochondria.
  - C) The cells have a poorly defined sarcoplasmic reticulum.
  - D) The muscles are striated and composed of sarcomeres.

Ans: C

**Feedback:**

Cardiac cells have a less clearly defined sarcoplasmic reticulum than do skeletal muscles. They also have intercalated disks and large, numerous mitochondria. Both types of muscles are striated and composed of sarcomeres.

9. An 81-year-old female client of a long-term care facility has a history of congestive heart failure. The nurse practitioner caring for the client has positioned her sitting up at an angle in bed and is observing her jugular venous distention. Why is jugular venous distention a useful indicator for the assessment of the client's condition?
- A) Increased cardiac demand causes engorgement of systemic blood vessels, of which the jugular vein is one of the largest.
  - B) Blood backs up into the jugular vein because there are no valves at the point of entry into the heart.
  - C) Peripheral dilation is associated with decreased stroke volume and ejection fraction.
  - D) Heart valves are not capable of preventing backflow in cases of atrial congestion.

Ans: B

**Feedback:**

Because there are no valves at the entry points to the atria, congestion can result in engorgement of the jugular veins, which are proximal to the heart. Increased cardiac demand is not associated with engorgement of vessels or peripheral dilation.

10. As part of their orientation to a cardiac care unit, a group of recent nursing graduates is receiving a refresher in cardiac physiology from the unit educator. Which of the following teaching points best captures a component of cardiac function?
- A) "Efficient heart function requires that the ventricles do not retain any blood at the end of the cardiac cycle."
  - B) "Recall that the heart sounds that we listen to as part of our assessments are the sounds of the myocardium contracting."
  - C) "The diastolic phase is characterized by relaxation of ventricles and their filling with blood."
  - D) "Aortic pressure will exceed ventricular pressure during systole."

Ans: C

**Feedback:**

Diastole is associated with ventricular filling and relaxation. Cardiac output is not 100% or near to it with each cardiac cycle, and heart sounds are associated with valve closing. Ventricular pressure exceeds that of the aorta during systole.

11. A patient is experiencing impaired circulation secondary to increased systemic arterial pressure. Which of the following statements is the most relevant phenomenon?
- A) Increased preload due to vascular resistance
  - B) High afterload because of backpressure against the left ventricle
  - C) Impaired contractility due to aortic resistance
  - D) Systolic impairment because of arterial stenosis

Ans: B

**Feedback:**

Increased pressure in the aorta and other arteries constitutes a greater amount of afterload work. This situation is not indicative of increased preload or impaired contractility. Systolic impairment is not a recognized characterization of inadequate cardiac performance.

12. In the ICU, the nurse hears an emergency cardiac monitor go off. The nurse looks at the telemetry and notices the patient has gone into ventricular tachycardia. The nurse will likely assess for signs/symptoms of
- A) development of hypertension with BP 190/98.
  - B) oxygen deprivation with O<sub>2</sub> saturation decreasing to approximately 90%.
  - C) decreasing cardiac output due to less ventricular filling time.
  - D) increasing cardiac index by correlating the volume of blood pumped by the heart with an individual's body surface area.

Ans: C

**Feedback:**

One of the dangers of ventricular tachycardia is a reduction in cardiac output because the heart does not have time to fill adequately.

13. A nurse is using a stethoscope and blood pressure cuff to manually measure a client's blood pressure. The nurse knows that which of the following facts related to blood flow underlies the ability to hear blood pressure by auscultation (listening)?
- A) The force of blood with each cardiac contraction produces friction on vessel walls that can be heard and felt.
  - B) The movement of smooth muscle surrounding vessels produces noise that is audible by a stethoscope.
  - C) Turbulent flow of blood during systole produces sound while laminar flow during diastole is silent.
  - D) Pressure pulsation that exceeds the velocity of blood flow is audible and coincides with systolic BP.

Ans: D

**Feedback:**

The pressure pulsations that accompany intermittent blood ejection from the ventricles cause sounds that are audible when measuring blood pressure and palpable at pulse sites. Friction, muscle movement, and turbulent blood flow do not account for the pressure pulsations.

14. Analysis has shown that a client's right atrial pressure is 30 mm Hg. What is the most likely conclusion that the client's care team will draw from this piece of data?
- A) The result is likely normal and gravity dependent given the lack of valves in thoracic and central veins.
  - B) The pressure is insufficient to provide adequate stroke volume and cardiac output.
  - C) The pressure is excessive given that the right atrium should be at atmospheric pressure.
  - D) Pressure pulsations are likely to be undetectable given the low atrial pressure.

Ans: C

**Feedback:**

Normal right atrial pressure is around 0 mm Hg, or atmospheric pressure. Right atrial pressure does not have a direct influence on stroke volume or pulse pressure.

15. A patient arrived at the emergency department 2 days after the development of “chest pressure” and “tightness” was treated with antacids thinking it was indigestion. His enzymes show a massive myocardial infarction (MI). Following angioplasty, the patient asks why so much muscle was damaged if only one vessel was blocked, the left circumflex. The nurse responds,
- A) “With any blockage in the heart, muscle damage always occurs.”
  - B) “If a major artery like the circumflex is occluded, the smaller vessels supplied by that vessel cannot restore the blood flow.”
  - C) “Since the circumflex artery supplies oxygenated blood flow to the posterior surface of the left ventricle, any amount of blockage will result in vital muscle tissue being lost.”
  - D) “When it comes to arteries in the heart, all vessels are equal, and any blockage causes a massive amount of damage that will not be restored.”

Ans: B

**Feedback:**

Hyperemia cannot occur when the arteries that supply the capillary beds are narrowed. For example, if a major coronary artery becomes occluded, the opening of channels supplied by that vessel cannot restore blood flow.

16. When explaining to a patient why he only had minimal muscle damage following 99% occlusion of the left anterior descending artery, the nurse will explain this is primarily due to
- A) the possibility that the person has elevated INR levels that prevent blood from backlogging in the vessel.
  - B) development of collateral circulation that builds channels between some of the smaller arteries usually when the flow is decreased gradually.
  - C) good genetic makeup that allows occluded arteries to keep vasodilating to meet metabolic needs.
  - D) the release of substances formed by special glands that transport the blood cell-by-cell through smaller spaces.

Ans: B

**Feedback:**

Collateral circulation is a mechanism for the long-term regulation of local blood flow. Anastomotic channels exist between some of the smaller arteries. These channels permit perfusion of an area by more than one artery. When the artery becomes occluded, these anastomotic channels increase in size, allowing blood from a patent artery to perfuse the area supplied by the occluded vessel.



17. Which of the following individuals is most likely to be experiencing vasodilation?
- A) A 51-year-old man with a history of hypertension who is taking a medication that blocks the effect of the renin–angiotensin–aldosterone system
  - B) A 9-year-old boy who has been given an injection of epinephrine to preclude an anaphylactic reaction to a bee sting
  - C) A 30-year-old woman who takes antihistamines to treat her seasonal allergies
  - D) A 32-year-old man who takes a selective serotonin reuptake inhibitor for the treatment of depression

Ans: A

**Feedback:**

Angiotensin is a potent vasoconstrictor, and medications that block this induce vasodilation. Epinephrine is also a vasoconstrictor. Histamine is a vasodilator, so antihistamine medications are likely to induce vasoconstriction. Serotonin is a vasoconstrictor, so medications that block its reuptake and increase free levels are apt to promote vasoconstriction.

18. When trying to explain to a new dialysis patient the movement of substances through the capillary pores, the nurse will explain that in the kidneys, the glomerular capillaries have
- A) no capillary openings since this would lead to extensive hemorrhage.
  - B) small openings that allow large amounts of smaller molecular substances to filter through the glomeruli.
  - C) large pores so that substances can pass easily through the capillary wall.
  - D) endothelial cells that are joined by tight junctions that form a barrier to medication filtration.

Ans: B

**Feedback:**

The glomerular capillaries in the kidneys have small openings called fenestrations that pass directly through the middle of the endothelial cells. These allow large amounts of small molecular and ionic substances to filter through the glomeruli without having to pass through the clefts between the endothelial cells.

19. A 51-year-old patient with a history of alcohol abuse and liver disease has low serum levels of albumin and presents with ascites (excess fluid in his peritoneal space) and jaundice. A health care professional would recognize that which of the following processes is most likely underlying his health problems?
- A) Low albumin is contributing to excess hydrostatic pressure and inappropriate fluid distribution.
  - B) Low albumin is inducing hypertension and increased filtration of fluid into interstitial spaces.
  - C) Insufficient albumin is causing insufficient absorption of fluid into the capillaries.
  - D) Low albumin contributing to an inability to counter gravitational effects.

Ans: C

**Feedback:**

Deficits of plasma proteins like albumin result in insufficient amounts of fluid being absorbed into the capillary circulation by osmotic pressure. It is not a result of hydrostatic pressure, hypertension, or the effects of gravity.

20. While intubated for surgery, a patient has inadvertently had his vagus nerve stimulated. What effect would the surgical team expect to observe?
- A) Decreased vascular perfusion due to parasympathetic stimulation
  - B) Decreased heart rate, contractility, and afterload
  - C) Decreased heart rate as a result of parasympathetic innervation of the heart
  - D) Decreased heart rate as a result of impaired acetylcholine reuptake

Ans: C

**Feedback:**

Vagal stimulation results in lowered heart rate as a result of parasympathetic stimulation. Vascular perfusion, contractility, and afterload would not be under direct effect. Acetylcholine reuptake would not be influenced.

21. A patient in the emergency department is experiencing a massive stroke with extremely low blood flow to the brain exhibited by a BP less than 60 mm Hg. The nurse suddenly notes there is a sharp rise in the BP to 250 mm Hg. This high BP lasts about 5 minutes, and then the BP drops sharply again. The pathophysiologic principle behind this is likely due to the
- A) activation of the autonomic nervous system.
  - B) release of mineralocorticoids.
  - C) CNS ischemic response.
  - D) protective homeostatic mechanism.

Ans: C

**Feedback:**

When blood flow to the brain has been sufficiently interrupted to cause ischemia of the vasomotor center, these vasomotor neurons become strongly excited. This causes massive vasoconstriction as a means of raising the blood pressure to levels as high as the heart can pump against. This response is called the *CNS ischemic response* and can raise BP to levels as high as 270 mm Hg for as long as 10 minutes.

## Chapter 26-a- Disorders of Blood Flow

1. If a virus has caused inflammation resulting in endothelial dysfunction, an excessive amount of endothelins in the blood can result in
  - A) arterial wall weakening resulting in aneurysm formation.
  - B) release of excess fatty plaque causing numerous pulmonary emboli.
  - C) contraction of the underlying smooth muscles within the vessels.
  - D) overproduction of growth factors resulting in new vessel production.

Ans: C

### Feedback:

Endothelial dysfunction describes several types of potentially reversible changes in endothelial function that occur in response to environmental stimuli. Inducers of endothelial dysfunction include cytokines, bacterial, viral, and parasitic products that cause inflammation. They also influence the reactivity of underlying smooth muscle cells through production of both relaxing factors (nitric oxide) and contracting factors (e.g., endothelins).

2. A nursing instructor is explaining the role of vascular smooth muscle cells in relation to increases in systemic circulation. During discussion, which neurotransmitter is primarily responsible for contraction of the entire muscle cell layer thus resulting in decreased vessel lumen radius?
  - A) Nitric oxide
  - B) Adrenal glands
  - C) Fibroblast growth factor
  - D) Norepinephrine

Ans: D

### Feedback:

Nerve cells and circulating hormones are responsible for vasoconstriction of the vessel walls. Because they do not enter the tunica media of the blood vessel, the nerves do not synapse directly on the smooth muscle cells. Instead, they release the neurotransmitter, norepinephrine, which diffuses into the media and acts on the nearby smooth muscle cells, resulting in contraction of the entire muscle cell layer and thus reducing the radius of the vessel lumen. This increases the systemic circulation.

3. A 55-year-old male who is beginning to take a statin drug for his hypercholesterolemia is discussing cholesterol and its role in health and illness with his physician. Which of the following aspects of hyperlipidemia would the physician most likely take into account when teaching the patient?
- A) Hyperlipidemia is a consequence of diet and lifestyle rather than genetics.
  - B) HDL cholesterol is often characterized as being beneficial to health.
  - C) Cholesterol is a metabolic waste product that the liver is responsible for clearing.
  - D) The goal of medical treatment is to eliminate cholesterol from the vascular system.

Ans: B

**Feedback:**

Because it transports cholesterol back to the liver from the periphery, HDL is associated with increased health and lowered risk of atherosclerosis. Genetics play a role in hyperlipidemia, and it is inaccurate to characterize cholesterol as a waste product. Cholesterol is necessary for several physiological processes, and complete elimination is neither realistic nor desirable.

4. Which of the following patients will likely experience difficulty in maintaining lipoprotein synthesis resulting in elevated LDL levels?
- A) A 55-year-old male admitted for exacerbation of chronic obstructive pulmonary disease (COPD)
  - B) A 44-year-old female admitted for hysterectomy due to cervical cancer with metastasis
  - C) A 35-year-old patient with a history of hepatitis C and B with end-stage liver disease
  - D) A 27-year-old patient with pancreatitis related to alcohol abuse

Ans: C

**Feedback:**

There are two sites of lipoprotein synthesis—the small intestine and the liver. The liver synthesizes and releases VLDL and HDL. IDL are taken to the liver and recycled to form VLDL or converted to LDL in the vascular compartment. Liver disease will result in this mechanism not working as expected. COPD, cervical cancer, and pancreatitis are not involved in elevated LDL levels.

5. In which of the following hospital patients would the care team most realistically anticipate finding normal cholesterol levels?
- A) A 44-year-old male admitted for hyperglycemia and with a history of diabetic neuropathy
  - B) A 77-year-old female admitted for rheumatoid arthritis exacerbation who is receiving hormone replacement therapy and with a history of hypothyroidism
  - C) A 51-year-old male with a diagnosis of hemorrhagic stroke and consequent unilateral weakness
  - D) A morbidly obese 50-year-old female who is taking diuretics and a beta-blocker to treat her hypertension

Ans: C

**Feedback:**

Hemorrhagic stroke is not a pathology noted to be associated with secondary hypercholesterolemia. Diabetes, thyroid medications, estrogen therapy, obesity, and beta-blocker medications are all correlated with hypercholesterolemia.

6. A nurse practitioner is instructing a group of older adults about the risks associated with high cholesterol. Which of the following teaching points should the participants try to integrate into their lifestyle after the teaching session?
- A) "Remember the 'H' in HDL and the 'L' in LDL correspond to high danger and low danger to your health."
  - B) "Having high cholesterol increases your risk of developing diabetes and irregular heart rate."
  - C) "Smoking and being overweight increases your risk of primary hypercholesterolemia."
  - D) "Your family history of hypercholesterolemia is important, but there are things you can do to compensate for a high inherited risk."

Ans: D

**Feedback:**

There is a genetic basis to high cholesterol, but lifestyle modification can compensate for many of the increased risks. LDL is more deleterious to health than HDL, and diabetes contributes to high cholesterol but not necessarily vice versa.

Hypercholesterolemia resulting from other factors is secondary rather than primary.

7. Which of the following medications will likely be prescribed for a patient with elevated LDL and triglyceride levels?

- A) Zocor (simvastatin), an HMG-CoA reductase inhibitor or “statin”
- B) Cholestyramine (Questran), a bile acid sequestrant
- C) Nicotinic acid (Niacin), a B vitamin
- D) Fenofibrate (Tricor), a fibric acid

Ans: A

**Feedback:**

The statins can reduce or block the hepatic synthesis of cholesterol and are the cornerstone of LDL-reducing therapy. Statins also reduce triglyceride levels and increase HDL levels.

8. When a 55-year-old patient's routine blood work returns, the nurse notes that his C-reactive protein (CRP) is elevated. The patient asks what that means. The nurse responds,

- A) “You must eat a lot of red meat since this means you have a lot of fat floating in your vessels.”
- B) “You are consuming high levels of folate, which works with the B vitamins and riboflavin to metabolize animal protein.”
- C) “This means you have high levels of HDL to balance the LDL found in animal proteins.”
- D) “This means you have elevated serum markers for systemic inflammation that has been associated with vascular disease.”

Ans: D

**Feedback:**

CRP is a serum marker for systemic inflammation. Elevated levels are associated with vascular disease. The normal metabolism of homocysteine requires adequate levels of folate, vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, and riboflavin. CRP is not associated with red meat consumption. LDL is an independent risk factor for the development of premature coronary heart disease.

9. A patient is reading a brochure on atherosclerosis while in the waiting room of medical clinic. Which of the following excerpts from the educational brochure warrants correction?
- A) "Because smoking causes a permanent increase in your risk of heart disease, it's best not to start."
  - B) "All things being equal, men have a higher risk of coronary heart disease than perimenopausal women."
  - C) "High blood pressure often accompanies, or even causes, clogging of the arteries."
  - D) "Every bit that you can lower your cholesterol means that you'll have a lower risk of developing heart disease."

Ans: A

**Feedback:**

Cessation of smoking is associated with a decrease in the risk of CHD. Males have an increased risk of atherosclerosis. Atherosclerosis is often associated with hypertension. Lowering cholesterol levels brings a commensurate reduction in risk of CHD.

10. When trying to educate a patient about the release of free radicals and the role they play in formation of atherosclerosis, which of the following statements is most accurate?
- A) The end result of oxidation is rupture of the plaque resulting in hemorrhage.
  - B) Activated cells that release free radicals oxidize LDL, which is harmful to the lining of your blood vessels.
  - C) Oxidized free radicals produce toxic metabolic waste that can kill liver cells.
  - D) Activated cells roam in the vascular system looking for inflammatory cells to engulf.

Ans: B

**Feedback:**

Activated macrophages release free radicals that oxidize LDL. Oxidized LDL is toxic to the endothelium, causing endothelial loss and exposure of the subendothelial tissue to the blood components. This leads to platelet adhesion and aggregation and fibrin deposition.



11. A nurse is providing care for a client who has a history of severe atherosclerosis. Which of the following clinical manifestations of the client's illness should the nurse anticipate and assess in the client?

- A) Motor deficits in muscles distal to plaque formation
- B) Peripheral vasodilation to compensate for ischemia
- C) Cognitive deficits due to ischemia or thrombosis
- D) Aneurysm formation due to weakening of blood vessel walls
- E) Necrosis of the vessel wall

Ans: D

**Feedback:**

Aneurysm can be a manifestation of atherosclerosis as a consequence of weakened vessel walls. Motor and cognitive deficits as well as vasodilation are not common manifestations of atherosclerosis. Necrosis of the vessel wall is associated with vasculitis.

12. Which of the following assessment findings of a newly admitted 30-year-old male client would be most likely to cause his physician to suspect polyarteritis nodosa?

- A) The man's blood work indicates polycythemia (elevated red cell levels) and leukocytosis (elevated white cells).
- B) The man's blood pressure is 178/102, and he has abnormal liver function tests.
- C) The man is acutely short of breath, and his oxygen saturation is 87%.
- D) The man's temperature is 101.9°F, and he is diaphoretic (heavily sweating).

Ans: B

**Feedback:**

Polyarteritis nodosa is associated with abnormal liver function and acute hypertension. Anemia, not elevated red cells, is a manifestation, while respiratory symptoms, diaphoresis, and fever are not noted to be accompaniments.

13. A patient arrives at the ED complaining of numbness in the left lower leg. Upon assessment, the nurse finds the lower left leg to be cold to touch, pedal and posterior tibial pulses nonpalpable, and a sharp line of paralysis/paresthesia. The nurse's next action is based on the fact that
- A) acute arterial occlusion is a medical emergency requiring immediate intervention to restore blood flow.
  - B) submersion in a whirlpool with warm water will improve the venous blood flow and restore pulses.
  - C) the immediate infusion of tissue plasminogen activator (tPA) will not correct the problem and should only be used for CVAs.
  - D) administration of an aspirin and sublingual nitroglycerin will vasodilate the artery to restore perfusion.

Ans: A

**Feedback:**

The presentation of acute arterial embolism is often described as that of the seven "P's": pistol shot, pallor, polar, pulselessness, pain, paresthesia, and paralysis. Treatment is aimed at restoring blood flow. Embolectomy, thrombolytic therapy, and anticoagulant therapy (heparin) are usually given. Application of cold should be avoided.

14. A 70-year-old male client presents to the emergency department complaining of pain in his calf that is exacerbated when he walks. His pedal and popliteal pulses are faintly palpable, and his leg distal to the pain is noticeably reddened. The nurse knows that the client is likely experiencing which of the following medical diagnosis/possible treatment plans listed below?
- A) Acute arterial occlusion that will be treated with angioplasty
  - B) Raynaud disease that will require antiplatelet medications
  - C) Atherosclerotic occlusive disease necessitating thrombolytic therapy
  - D) Giant cell temporal arteritis that will be treated with corticosteroids

Ans: C

**Feedback:**

The client's symptoms of calf pain with intermittent claudication and diminished pulses are the hallmarks of atherosclerotic occlusive disease. These signs and symptoms are not as closely associated with acute arterial occlusion or giant cell temporal arteritis and are not related to Raynaud disease.

15. A young woman has been diagnosed by her family physician with primary Raynaud disease. The woman is distraught stating, "I've always been healthy, and I can't believe I have a disease now." What would be her physician's most appropriate response?
- A) "This likely won't have a huge effect on your quality of life, and I'll prescribe anticoagulating drugs to prevent attacks."
  - B) "I'll teach you some strategies to minimize its effect on your life, and minor surgery to open up your blood vessels will help too."
  - C) "You need to make sure you never start smoking, and most of the symptoms can be alleviated by regular physical activity."
  - D) "If you make sure to keep yourself warm, it will have a fairly minimal effect; I'll also give you pills to enhance your circulation."

Ans: D

**Feedback:**

Ensuring total body warmth and the use of vasodilators are the normal treatment modalities for Raynaud disease.

16. During a routine physical examination of a 66-year-old woman, her nurse practitioner notes a pulsating abdominal mass and refers the woman for further treatment. The nurse practitioner is explaining the diagnosis to the client, who is unfamiliar with aneurysms. Which of the following aspects of the pathophysiology of aneurysms would underlie the explanation the nurse provides?
- A) Aneurysms are commonly a result of poorly controlled diabetes mellitus.
  - B) Hypertension is a frequent modifiable contributor to aneurysms.
  - C) Individuals with an aneurysm are normally asymptomatic until the aneurysm ruptures.
  - D) Aneurysms can normally be resolved with lifestyle and diet modifications.

Ans: B

**Feedback:**

Hypertension is associated with over half of aneurysms. They are not consequences of diabetes, and while some are asymptomatic in early stages, this is not necessarily the norm and does not necessarily culminate in a rupture. Aneurysms normally require surgical repair.

17. In which of the following patients is the emergency department staff most likely to suspect an abdominal aortic aneurysm?
- A) A 60-year-old client with diminished oxygen saturation, low red blood cell levels, and pallor
  - B) A 70-year-old woman with jugular venous distention, shortness of breath, and pulmonary edema
  - C) A 66-year-old client with facial edema, cough, and neck vein distention
  - D) An 81-year-old man with acute cognitive changes as well as difficulty in speaking and swallowing

Ans: C

**Feedback:**

Facial edema, cough, and neck vein distention are associated with abdominal aortic aneurysms. Low red cells, pulmonary edema, and cognitive changes are not associated with abdominal aortic aneurysms.

18. A 44-year-old female who is on her feet for the duration of her entire work week has developed varicose veins in her legs. What teaching point would her care provider be most justified in emphasizing to the woman?
- A) "Once you have varicose veins, there's little that can be done to reverse them."
  - B) "Your varicose veins are likely a consequence of an existing cardiac problem."
  - C) "If you're able to stay off your feet and wear tight stockings, normal vein tone can be reestablished."
  - D) "The use of blood thinner medications will likely relieve the backflow that is causing your varicose veins."

Ans: A

**Feedback:**

Treatment of varicose veins focuses on prevention and slowing of the progression of the problem; it is not normally possible to reverse existing varicose veins. Staying off one's feet and wearing antiembolic stockings may prevent, but not reverse, the condition. While cardiac problems may coexist with varicose veins, this does not necessarily account for the woman's condition. Blood thinners will not resolve her varicose veins.

19. An elderly patient arrives to the health care provider's office complaining of a "sore" that would not heal on his lower leg. Upon assessment, the nurse finds thin, shiny, bluish brown pigmented desquamative skin. It is located medially over the lower leg. The nurse will educate the patient that the usual treatment is
- A) hydrotherapy to facilitate improvement in circulation.
  - B) compression therapy to help facilitate blood flow back to the vena cava.
  - C) initiation of Coumadin therapy to maintain an INR of 2 to 3 above norm.
  - D) long-term antibiotic therapy to facilitate healing of the wound.

Ans: B

**Feedback:**

: Treatment of venous ulcers includes compression therapy with dressings and inelastic or elastic bandages. Medications that help include aspirin and pentoxifylline. Occasionally skin grafting may be required. Hydrotherapy, Coumadin therapy, and long-term antibiotic therapy are usually not required for venous ulcers.

20. A physician is explaining to a group of medical students the concept of Virchow triad as it applies to venous thrombosis. Which of the following clinical observations of a 50-year-old male client is most likely unrelated to a component of Virchow triad?
- A) The man has decreased cardiac output and an ejection fraction of 30%.
  - B) The man's prothrombin time and international normalized ratio (INR) are both low.
  - C) The man has a previous history of a dissecting aneurysm.
  - D) There is bilateral, brown pigmentation of his lower legs.

Ans: A

**Feedback:**

Cardiac output is not a component of Virchow triad. However, decreased INR and prothrombin time indicate hypercoagulability; a dissecting aneurysm is an example of vessel wall injury; and pigmentation in the lower legs indicates stasis of blood.

## Chapter 26-b-Disorders of Blood Pressure Regulation

1. A 74-year-old man is being assessed by a nurse as part of a weekly, basic health assessment at the long-term care facility where he resides. His blood pressure at the time is 148/97 mm Hg, with a consequent pulse pressure of 51 mm Hg. The nurse would recognize that which of the following is the most significant determinant of the resident's pulse pressure?
  - A) Blood volume, resistance, and flow
  - B) The cardiac reserve or possible increase in cardiac output over normal resting level
  - C) The amount of blood that his heart ejects from the left ventricle during each beat
  - D) The relationship between total blood volume and resting heart rate

Ans: C

**Feedback:**

Pulse pressure is a reflection of the amount of blood that the heart ejects from the left ventricle during each beat combined with the distensibility of the arterial tree. Other factors such as blood flow characteristics, cardiac reserve, heart rate, and blood volume are less directly associated with pulse pressure.

2. At 4 AM, the hemodynamic monitor for a critically ill client in the intensive care unit indicates that the client's mean arterial pressure is at the low end of the normal range; at 6 AM, the client's MAP has fallen definitively below normal. The client is at risk for
  - A) pulmonary hypertension.
  - B) left ventricular hypertrophy.
  - C) organ damage and hypovolemic shock.
  - D) orthostatic hypotension.

Ans: C

**Feedback:**

The mean arterial pressure, which represents the average blood pressure in the systemic circulation, is a good indicator of tissue perfusion. Hospitalization and bed rest predispose to dehydration and low blood volume. Blood pressure normally follows a diurnal pattern in which pressures are highest in the morning. The fact that this client's MAP is falling at a time when it should be at its daily peak is the cause for grave concern; blood volume is likely low, and vital organs, which depend on adequate perfusion, are at risk.

3. The nurse practitioner working in an overnight sleep lab is assessing and diagnosing patients with sleep apnea. During this diagnostic procedure, the nurse notes that a patient's blood pressure is 162/97. The nurse explains this connection to the patient based on which of the following pathophysiological principles?
- A) During apneic periods, the patient experiences hypoxemia that stimulates chemoreceptors to induce vasoconstriction.
  - B) When the patient starts to snore, his epiglottis is closed over the trachea.
  - C) When the airway is obstructed, specialized cells located in the back of the throat send signals to the kidney to increase pulse rate.
  - D) When airways are obstructed, the body will retain extracellular fluid so that this fluid can be shifted to intravascular space to increase volume.

Ans: A

**Feedback:**

People with sleep apnea also may experience an increase in BP because of the hypoxemia that occurs during the apneic periods. The specialized chemoreceptors are located in carotid bodies and aortic bodies of the aorta. Retention of fluid is not the cause of increased BP during sleep apnea episodes.

4. A 54-year-old man with a long-standing diagnosis of essential hypertension is meeting with his physician. The patient's physician would anticipate that which of the following phenomena is most likely occurring?
- A) The patient's juxtaglomerular cells are releasing aldosterone as a result of sympathetic stimulation.
  - B) Epinephrine from his adrenal gland is initiating the renin–angiotensin–aldosterone system.
  - C) Vasopressin is exerting an effect on his chemoreceptors and baroreceptors resulting in vasoconstriction.
  - D) The conversion of angiotensin I to angiotensin II in his lungs causes increases in blood pressure and sodium reabsorption.

Ans: D

**Feedback:**

Angiotensin conversion in the lungs is a component of the renin–angiotensin–aldosterone system that ultimately increases blood pressure and sodium reabsorption. Juxtaglomerular cells release renin, and epinephrine (vasopressin) is responsible for neither initiating the renin–angiotensin–aldosterone system nor directly influencing chemoreceptors and baroreceptors.

5. A group of novice nursing students are learning how to manually measure a client's blood pressure using a stethoscope and sphygmomanometer. Which of the following statements by students would the instructor most likely need to correct?
- A) "I'll inflate the cuff around 30 mm Hg above the point at which I can't palpate the client's pulse."
  - B) "If my client's arm is too big for the cuff, I'm going to get a BP reading that's artificially low."
  - C) "The accuracy of the whole process depends on my ability to clearly hear the Korotkoff sounds with the bell of my stethoscope."
  - D) "With practice, my measurement of clients' blood pressures with this method will be more accurate than with automated machines."

Ans: B

**Feedback:**

Undercuffing yields a blood pressure reading that is overestimated. The cuff should indeed be inflated to 30 mm Hg above palpated systolic pressure and is both dependent on clear auscultation of the Korotkoff sounds. The properly performed manual method is more accurate than automated measurement.

6. A number of older adults have come to attend a wellness clinic that includes both blood pressure monitoring and education about how to best control blood pressure. Which of the leader's following teaching points is most accurate?
- A) "It's important to minimize the amount of potassium and, especially, sodium in your diet."
  - B) "High blood pressure is largely controllable, except for those with a significant family history or African Americans."
  - C) "Too much alcohol, too little exercise, and too much body fat all contribute to high blood pressure."
  - D) "Hypertension puts you at a significant risk of developing type 2 diabetes later in life."

Ans: C

**Feedback:**

Obesity, excess alcohol consumption, and a sedentary lifestyle are all linked with hypertension. Inadequate, rather than excessive, potassium intake is thought to be causative, and while race and family influence an individual's predisposition to hypertension, it does not render the condition untreatable or uncontrollable. Diabetes is thought to be a contributor to hypertension, not vice versa.



7. When advising a morbidly obese patient about the benefits of weight reduction, which of the following statements would be most accurate to share?
- A) "All you need to do is stop drinking sodas and sugary drinks."
  - B) "A 10 lb loss of weight can produce a decrease in blood pressure."
  - C) "An increased 'waist-to-hip' ratio can lead to too much pressure on the liver and intestines."
  - D) "If your leptin (hormone) level is too low, you are at increased risk for developing high BP."

Ans: B

**Feedback:**

Weight reduction of as little as 4.5 kg (10 lb) can produce a decrease in BP in a large proportion of overweight people with hypertension. There are no data to suggest this patient has a history of high intake of sodas. An increased waist-to-hip ratio is associated with hypertension. Leptin acts on the hypothalamus to increase BP by activating the SNS.

8. A physician is providing care for several patients on a medical unit of a hospital. In which of the following patient situations would the physician most likely rule out hypertension as a contributing factor?
- A) A 61-year-old man who has a heart valve infection and recurrent fever
  - B) An 81-year-old woman who has had an ischemic stroke and has consequent one-sided weakness
  - C) A 44-year-old man awaiting a kidney transplant who requires hemodialysis three times per week
  - D) A 66-year-old woman with poorly controlled angina and consequent limited activity tolerance

Ans: A

**Feedback:**

While cardiac complications are common sequelae of hypertension, a heart valve infection would be less likely to be so. Stroke, kidney failure, and angina are all identified as consequences of hypertension.

9. An autopsy is being performed on a 44-year-old female who died unexpectedly of heart failure. Which of the following components of the pathologist's report is most suggestive of a possible history of poorly controlled blood pressure?
- A) "Scarring of the urethra suggestive of recurrent urinary tract infections is evident."
  - B) "Bilateral renal hypertrophy is noted."
  - C) "Vessel wall changes suggestive of venous stasis are evident."
  - D) "Arterial sclerosis of subcortical brain regions is noted."

Ans: D

**Feedback:**

Neurological consequences of hypertension include narrowing and sclerosis of subcortical regions. Urethral scarring and impaired venous return would be less likely to derive from hypertension, and while nephrosclerosis and glomerular damage are associated with hypertension, hypertrophy of the kidneys themselves is not noted as an indicator.

10. During a routine physical exam for a patient diagnosed with hypertension, the nurse practitioner will be most concerned if which of the following assessments are found?
- A) Noted hemorrhages and microaneurysms during evaluation of the internal eye
  - B) Unable to feel vibrations when a tuning fork is placed on the skull
  - C) Inability to locate the kidneys with deep palpation to the abdomen
  - D) Slight increase in the number of varicose veins noted bilaterally

Ans: A

**Feedback:**

Hypertension affects the eye in sometimes devastating ways. If there are acute increases in BP, hemorrhages, microaneurysms, and hard exudates can manifest. Vibrations relate to hearing loss. The kidneys should not be palpable to touch. Varicose veins are not associated with hypertension.

11. A nurse is providing care for a number of older clients on a restorative care unit of a hospital. Many of the clients have diagnoses or histories of hypertension, and the nurse is responsible for administering a number of medications relevant to blood pressure control. Which of the following assessments would the nurse be most justified in eliminating during a busy morning on the unit?
- A) Checking the recent potassium levels of a client receiving an ACE inhibitor
  - B) Measuring the heart rate of a client who takes a  $\beta$ -adrenergic blocker
  - C) Measuring the pulse of a client taking an ACE inhibitor
  - D) Noting the sodium and potassium levels of a client who is receiving a diuretic

Ans: C

**Feedback:**

ACE inhibitors act on the renin-angiotensin-aldosterone system and thus do not significantly influence heart rate. They can, however, induce hyperkalemia, and it would be prudent for the nurse to check potassium levels.  $\beta$ -adrenergic blockers affect a client's heart rate, and diuretics can affect electrolyte levels.

12. Which of the following hypertensive individuals is most likely to have his or her high blood pressure diagnosed as secondary rather than essential?

- A) A 51-year-old male who has been diagnosed with glomerulonephritis
- B) An African American man who leads a sedentary lifestyle
- C) A 69-year-old woman with a diagnosis of cardiometabolic syndrome
- D) A 40-year-old smoker who eats excessive amounts of salt and saturated fats

Ans: A

**Feedback:**

Damage to the organs that control and mediate the control of blood pressure, most notably the kidneys, is associated with secondary hypertension. Race, lifestyle, sodium intake, and associated cardiac and metabolic sequelae are associated with essential hypertension.

13. A patient is admitted to the outpatient diagnostic unit for further testing to identify the cause of the uncontrolled secondary hypertension. In preparation, the nurse should anticipate that which of the following diagnostic procedures will provide the most definitive diagnosis?

- A) Routine ultrasound of kidney
- B) Renal arteriography
- C) Echocardiography
- D) Serum creatinine level

Ans: B

**Feedback:**

: With the dominant role that the kidney assumes in blood pressure regulation, it is not surprising that the largest single cause of secondary hypertension is renal disease. Renal arteriography remains the definitive test for identifying renal artery disease. Ultrasound, CT, and MRA are other tests that can be used to screen for renovascular hypertension.

14. A physical assessment of a 28-year-old female patient indicates that her blood pressure in her legs is lower than that in her arms and that her brachial pulse is weaker in her left arm than in her right. In addition, her femoral pulses are weak bilaterally. Which of the following possibilities would her care provider most likely suspect?

- A) Pheochromocytoma
- B) Essential hypertension
- C) Coarctation of the aorta
- D) An adrenocortical disorder

Ans: C

**Feedback:**

The differences in blood pressure between the upper and lower extremities combined with weak femoral pulses and unilateral brachial pulse weakness are associated most strongly with coarctation of the aorta.

15. During a prenatal education class, an expectant mother tells the group about a friend whose blood pressure became so high during pregnancy that she had to be admitted to hospital. Which of the following statements should the nurse include in response to this?
- A) "A large increase in blood pressure is a normal part of the changes in blood circulation that accompany pregnancy."
  - B) "By avoiding salt, staying active, and minimizing weight gain, you can prevent this during your pregnancy."
  - C) "Essentially, experts don't really know why so many pregnant women develop high blood pressure."
  - D) "I'm sure this was hard for your friend, but rest assured that it won't affect your baby even if it affects you."

Ans: C

**Feedback:**

The root causes of pregnancy-induced hypertension are not known. It is pathological rather than normal, however, and it cannot necessarily be avoided by lifestyle modifications. It can be pernicious to both the mother and the fetus.

16. A formerly normotensive woman, pregnant for the first time, develops hypertension and headaches at 26 weeks' gestation. Her blood pressure is 154/110 mm Hg, and she has proteinuria. What other lab tests should be ordered for her?
- A) Plasma angiotensin I and II and renin
  - B) Urinary sodium and potassium
  - C) Platelet count, serum creatinine, and liver enzymes
  - D) Urinary catecholamines and metabolites

Ans: C

**Feedback:**

This woman shows signs and symptoms of preeclampsia. A low platelet count with elevated serum creatinine and liver enzymes would reinforce this diagnosis. The other tests might indicate kidney problems or the presence of a pheochromocytoma, but her symptoms do not indicate a need for these tests.

17. A 16-year-old adolescent who received a kidney transplant at the age of 10 has recently developed a trend of increasing BP readings. Of the following list of medications, which may be the primary cause for the development of hypertension?
- A) Furosemide (Lasix)
  - B) Cyclosporine (Sandimmune)
  - C) Isotretinoin (Accutane)
  - D) Hydrochlorothiazide (Hydrodiuril)

Ans: B

**Feedback:**

The nephrotoxicity of the drug cyclosporine, an immunosuppressant used in transplant therapy, may cause hypertension in children after bone marrow, heart, kidney, or liver transplantation.

18. A nurse working on a gerontology unit notes that the majority of the clients on the unit are prescribed antihypertensive medications. When it comes to the aging process, which of the following phenomena are primarily the contributing factors to hypertension in the elderly population? Select all that apply.

- A) Stiffening of large arteries like the aorta
- B) Increased sensitivity of the renin–angiotensin–aldosterone system
- C) Decreased baroreceptor sensitivity and renal blood flow
- D) Increased peripheral vascular resistance
- E) Increase in renal perfusion

Ans: A, C, D

**Feedback:**

Increased sensitivity of the renin–angiotensin–aldosterone system is not a noted phenomenon among older adults. Stiffening of large arteries, increased peripheral vascular resistance, and decreased baroreceptor sensitivity and renal blood flow are all accompaniments of aging.

19. A physiotherapist is measuring the lying, sitting, and standing blood pressure of a patient who has been admitted to hospital following a syncopal episode and recent falls. Which of the following facts about the patient best relates to these health problems?

- A) The patient is male and has a history of hypertension.
- B) The patient's cardiac ejection fraction was 40% during his last echocardiogram.
- C) The patient has a history of acute and chronic renal failure.
- D) The client is 89 years old and takes a diuretic medication for his congestive heart failure.

Ans: D

**Feedback:**

Old age and diuretic use are strongly associated with orthostatic hypotension, which is normally marked by falls and syncope. Gender, hypertension, stroke volume, and kidney disease are less likely to be causative factors.

20. A 78-year-old male patient has undergone a total knee replacement. He just does not feel like getting out of bed and moving around. After 3 days of staying in bed, the physical therapist encourages him to get out of bed to the chair for meals. He starts to complain of dizziness and light-headedness. These symptoms are primarily caused by which of the following pathophysiological principles? Select all that apply. The patient(s)
- A) is experiencing a reduction in plasma volume.
  - B) peripheral vasoconstriction mechanism has failed.
  - C) is so stressed that he is releasing too many endorphins.
  - D) is still bleeding from the surgical procedure.
  - E) has lost all of his muscle tone.

Ans: A, B

**Feedback:**

Prolonged bed rest promotes a reduction in plasma volume, a decrease in venous tone, failure of peripheral vasoconstriction, and weakness of the skeletal muscles that support the veins and assist in returning blood to the heart. Endorphins make one feel better in mood. Three days post-op, there should be no further bleeding from the surgical site. If there is, then this is a complication that must be addressed immediately. Loss of vascular and skeletal muscle tone is less predictable but probably becomes maximal after 2 weeks.

## Chapter 27-a- Disorders of Cardiac Function

1. In which of the following patient situations would a physician be most justified in preliminarily ruling out pericarditis as a contributing pathology to the patient's health problems?
- A) A 61-year-old man whose ECG was characterized by widespread T-wave inversions on admission but whose T waves have recently normalized
  - B) A 77-year-old with diminished S<sub>3</sub> and S<sub>4</sub> heart tones, irregular heart rate, and a history of atrial fibrillation
  - C) A 56-year-old obese man who is complaining of chest pain that is exacerbated by deep inspiration and is radiating to his neck and scapular ridge
  - D) A 60-year-old woman whose admission blood work indicates elevated white cells, erythrocyte sedimentation rate, and C-reactive protein levels

Ans: B

### Feedback:

S<sub>3</sub> and S<sub>4</sub> irregularities and irregular heart rate are not noted symptoms of pericarditis. Widespread T-wave inversions that later normalize; chest pain radiating to the neck and scapula that is worse on inspiration; and high white cells, erythrocyte sedimentation rate, and C-reactive protein levels are all indicators of pericarditis.

2. Following cardiac surgery, the nurse suspects the patient may be developing a cardiac tamponade. Which of the following clinical manifestations would support this diagnosis? Select all that apply.
- A) Muffled heart tones
  - B) Narrowed pulse pressure
  - C) Low BP—84/60
  - D) Heart rate 78
  - E) Bounding femoral pulse

Ans: A, B, C

### Feedback:

Cardiac tamponade results in increased intracardiac pressure, progressive limitation of ventricular diastolic filling, and decreased stroke volume and cardiac output. This accumulation of fluid results in tachycardia, elevated CVP, jugular vein distention, fall in systolic BP, narrowed pulse pressure, and signs of shock. Heart sounds may be muffled. A pulse rate of 78 is normal (not tachycardic). With pulsus paradoxus, the arterial pulse as palpated at the carotid or femoral artery becomes weakened (not bulging) or absent with inspiration.

3. Which of the following phenomena would be most likely to accompany increased myocardial oxygen demand ( $MVO_2$ )?

- A) Inadequate ventricular end-diastolic pressure
- B) Use of calcium channel blocker medications
- C) Increased aortic pressure
- D) Ventricular atrophy

Ans: C

**Feedback:**

An increase in aortic pressure results in a rise in afterload, wall tension, and, ultimately,  $MVO_2$ . Increased, not inadequate, ventricular end-diastolic pressure would cause an increase in  $MVO_2$ , and medications such as calcium channel blockers would decrease  $MVO_2$ . Hypertrophy of ventricles would occur in response to prolonged wall stress and consequent oxygen demand.

4. As part of the diagnostic workup for a male client with a complex history of cardiovascular disease, the care team has identified the need for a record of the electrical activity of his heart, insight into the metabolism of his myocardium, and physical measurements and imaging of his heart. Which of the following series of tests is most likely to provide the needed data for his diagnosis and care?

- A) Echocardiogram, PET scan, ECG
- B) Ambulatory ECG, cardiac MRI, echocardiogram
- C) Serum creatinine levels, chest auscultation, myocardial perfusion scintigraphy
- D) Cardiac catheterization, cardiac CT, exercise stress testing

Ans: A

**Feedback:**

An echocardiogram would provide an image of the client's heart, while a PET scan reveals metabolic activity and an ECG the electrical activity. Answer B would lack data on the client's myocardial metabolism; answer C would lack electrical and physical measurement information; answer D would lack electrical measurement of his heart.



5. Which of the following teaching points would be most appropriate for a group of older adults who are concerned about their cardiac health?
- A) "People with plaque in their arteries experience attacks of blood flow disruption at seemingly random times."
  - B) "The plaque that builds up in your heart vessels obstructs the normal flow of blood and can even break loose and lodge itself in a vessel."
  - C) "Infections of any sort are often a signal that plaque disruption is in danger of occurring."
  - D) "The impaired function of the lungs that accompanies pneumonia or chronic obstructive pulmonary disease is a precursor to plaque disruption."

Ans: B

**Feedback:**

Stable plaque is associated with obstruction of blood flow, while unstable plaque may dislodge and result in thrombus formation. Plaque disruption is noted to correlate with sympathetic events and is not seemingly random; infections and respiratory problems are not noted to be associated with obstruction of blood flow, however.

6. Four patients were admitted to the emergency department with severe chest pain. All were given preliminary treatment with aspirin, morphine, oxygen, and nitrates and were monitored by ECG. Which patient most likely experienced myocardial infarction?
- A) A 33-year-old male whose pain started at 7 AM during moderate exercise and was relieved by nitrates; ECG was normal; cardiac markers remained stable.
  - B) A 67-year-old female whose pain started at 2 AM while she was asleep and responded to nitrates; the ECG showed arrhythmias and ST-segment elevation; cardiac markers remained stable.
  - C) An 80-year-old woman whose pain started at 6 AM shortly after awakening and was not relieved by nitrates or rest; the ECG showed ST-segment elevation with inverted T waves and abnormal Q waves; levels of cardiac markers subsequently rose.
  - D) A 61-year-old man whose pain started at 9 AM during a short walk and responded to nitrates, but not to rest; ECG and cardiac markers remained stable, but anginal pattern worsened.

Ans: C

**Feedback:**

The chest pain of myocardial infarction does not respond to rest or to nitrates. Ischemic injury to the myocardium alters the ECG patterns, often elevating the ST segment and inverting T waves. Abnormal Q waves indicate necrosis. Cardiac markers are released in response to myocardial injury; rising levels indicate damage to the heart. The other patients have angina of varying severity.

7. Which of the following statements provides blood work results and rationale that would be most closely associated with acute coronary syndrome?
- A) Increased serum creatinine and troponin I as a result of enzyme release from damaged cells
  - B) Increased serum potassium and decreased sodium as a result of myocardial cell lysis, release of normally intracellular potassium, and disruption of the sodium–potassium pump
  - C) Elevated creatine kinase and troponin, both of which normally exist intracellularly rather than in circulation
  - D) Low circulatory levels of myoglobin and creatine kinase as a result of the inflammatory response

Ans: C

**Feedback:**

Myocardial necrosis releases creatine kinase and troponins that normally exist intracellularly. Serum creatinine and potassium are not core markers of heart damage, and myoglobin and creatine kinase levels rise, not fall, with cardiac events.

8. A number of clients have presented to the emergency department in the last 32 hours with complaints that are preliminarily indicative of myocardial infarction. Which of the following clients is least likely to have an ST-segment myocardial infarction (STEMI)?
- A) A 70-year-old woman who is complaining of shortness of breath and vague chest discomfort
  - B) A 66-year-old man who has presented with fatigue, nausea and vomiting, and cool, moist skin
  - C) A 43-year-old man who woke up with substernal pain that is radiating to his neck and jaw
  - D) A 71-year-old man who has moist skin, fever, and chest pain that is excruciating when he moves but relieved when at rest

Ans: D

**Feedback:**

STEMI pain is not normally relieved by rest, nor would fever be a common symptom. Shortness of breath, vague chest discomfort, fatigue, GI symptoms, and radiating substernal pain are all associated with STEMI.

9. Following a ST-segment myocardial infarction (STEMI), the nurse should be assessing the patient for which of the following complications? Select all that apply.

- A) Large amount of pink, frothy sputum and new onset of murmur
- B) Tachypnea with respiratory distress
- C) Frequent ventricular arrhythmia unrelieved with amiodarone drip
- D) Complaints of facial numbness and tingling
- E) Enhanced renal perfusion as seen as an increase in urine output

Ans: A, B, C, D

**Feedback:**

Following MI, many complications can occur: Answer choice A relates to pulmonary edema or papillary muscle rupture; answer choice B refers that acute respiratory distress could result from heart failure; answer choice C relates to life-threatening arrhythmias; answer choice D relates to acute stroke.

10. A 78-year-old man has been experiencing nocturnal chest pain over the last several months, and his family physician has diagnosed him with variant angina. Which of the following teaching points should the physician include in his explanation of the man's new diagnosis?

- A) "I'll be able to help track the course of your angina through regular blood work that we will schedule at a lab in the community."
- B) "With some simple lifestyle modifications and taking your heparin regularly, we can realistically cure you of this."
- C) "I'm going to start you on low-dose aspirin, and it will help greatly if you can lose weight and keep exercising."
- D) "There are things you can do to reduce the chance that you will need a heart bypass, including limiting physical activity as much as possible."

Ans: C

**Feedback:**

Aspirin, exercise, and weight loss are all identified treatments for angina. Angina does not normally necessitate blood work, heparin administration, or avoidance of activity.

11. The initial medical management for a symptomatic patient with obstructive hypertrophic cardiomyopathy (HCM) would be administering a medication to block the effects of catecholamines. The nurse will anticipate administering which of the following medications?

A) Lisinopril, an ACE inhibitor  
B) Lasix, a diuretic  
C) Propranolol, a  $\beta$ -adrenergic blocker  
D) Lanoxin, an inotropic

Ans: C

**Feedback:**

$\beta$ -Adrenergic blockers are generally the initial choice for persons with symptomatic HCM. Calcium channel blockers can also be used. ACE inhibitors, diuretics, or positive inotropics are not the first-line medications.

12. Which of the following ECG patterns would the nurse observe in a patient admitted for arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D)? Select all that apply.

A) Atrial flutter  
B) Ventricular tachycardia with left bundle branch block pattern  
C) T-wave inversion in the right precordial leads  
D) Sinus arrhythmia with a first-degree AV block  
E) Development of a "U" wave following a normal T wave

Ans: B, C

**Feedback:**

The electrical (ECG) changes associated with ARVC/D include ventricular tachycardia with LBBB, T-wave inversion in the right precordial leads, and epsilon waves. Right ventricular BBB may also be present. Atrial flutter and sinus arrhythmia with a first-degree AV block are not characteristic of this form of cardiomyopathy.

13. A 31-year-old African American female who is in her 30th week of pregnancy has been diagnosed with peripartum cardiomyopathy. Which of the following statements best captures an aspect of peripartum cardiomyopathy?
- A) Her diagnosis might be attributable to a disordered immune response, nutritional factors, or infectious processes.
  - B) Treatment is possible in postpartum women, but antepartum women are dependent on spontaneous resolution of the problem.
  - C) Mortality exceeds 50%, and very few surviving women regain normal heart function.
  - D) Symptomatology mimics that of stable angina and is diagnosed and treated similarly.

Ans: A

**Feedback:**

Immune responses, diet, and infections are all potential etiologies of peripartum cardiomyopathy. Treatment is complicated, but not impossible, in antepartum women due to possible teratogenic drug effects. About half of women suffer long-term effects on cardiac function, while signs and symptoms are similar to those of early heart failure.

14. An IV drug abuser walks into the ED telling the nurse that, "he is sick." He looks feverish with flushed, moist skin; dehydrated with dry lips/mucous membranes; and fatigued. The assessment reveals a loud murmur. An echocardiogram was ordered that shows a large vegetation growing on his mitral valve. The patient is admitted to the ICU. The nurse will be assessing this patient for which possible life-threatening complications?
- A) Systemic emboli, especially to the brain
  - B) Petechial hemorrhages under the skin and nail beds
  - C) GI upset from the massive amount of antibiotics required to kill the bacteria
  - D) Pancreas enlargement due to increased need for insulin secretion

Ans: A

**Feedback:**

Systemic emboli develop and break off the mitral valve and travel into the vascular system. There is a high probability that the emboli could lodge in the brain, kidneys, lower extremities, etc. Answer choice B refers that petechial hemorrhages are signs and symptoms of IE. GI upset is common following antibiotic therapy but is not usually life threatening. Stress can increase insulin needs but not associated with pancreas enlargement.

15. A 34-year-old man who is an intravenous drug user has presented to the emergency department with malaise, abdominal pain, and lethargy. The health care team wants to rule out endocarditis as a diagnosis. Staff of the department would most realistically anticipate which of the following sets of diagnostics?
- A) CT of the heart, chest x-ray, and ECG
  - B) Echocardiogram, blood cultures, and temperature
  - C) ECG, blood pressure, and stress test
  - D) Cardiac catheterization, chest x-ray, electrolyte measurement, and white cell count

Ans: B

**Feedback:**

An echocardiogram would help visualize the heart, while blood cultures would confirm the presence or absence of microorganisms in circulation, and temperature would gauge the presence of infection. A chest x-ray, blood pressure measurement, and cardiac catheterization would be less likely to indicate infective endocarditis.

16. A 13-year-old boy has had a sore throat for at least a week and has been vomiting for 2 days. His glands are swollen, and he moves stiffly because his joints hurt. His parents, who believe in “natural remedies,” have been treating him with various herbal preparations without success and are now seeking antibiotic treatment. Throat cultures show infection with group A streptococci. This child is at high risk for
- A) myocarditis.
  - B) mitral valve stenosis.
  - C) infective endocarditis.
  - D) vasculitis.

Ans: B

**Feedback:**

Group A streptococcal infection can be adequately treated with antibiotics, but this infection may have been present long enough to trigger an immune response—rheumatic fever—that will damage his heart valves, ultimately causing mitral valve stenosis. Group A streptococcal infection is not known to predispose to myocarditis, endocarditis, or vasculitis and aneurysm of coronary arteries.

17. On a routine physical exam visit, the physician mentions that he hears a new murmur. The patient gets worried and asks, "What does this mean?" The physician responds,
- A) "It would be caused by stress. Let's keep our eye on it and see if it goes away with your next visit."
  - B) "This could be caused by an infection. Have you been feeling well the past few weeks?"
  - C) "One of your heart valves is not opening properly. We need to do an echocardiogram to see which valve is having problem."
  - D) "This may make you a little more fatigued than usual. Let me know if you start getting dizzy or light-headed."

Ans: C

**Feedback:**

Stenosis refers to a narrowing of the valve orifice and failure of the valve leaflets to open normally. Blood flow through a normal valve can increase by five to seven times the resting volume. Valvular disease is not caused by stress. The murmur can be caused not only by infection but also by stenosis or regurgitation of a valve leaflet. The valve problem is very severe if it is causing signs of decreased cardiac output.

18. A client has been diagnosed with mitral valve stenosis following his recovery from rheumatic fever. Which of the following teaching points would be most accurate to convey to the client?
- A) "The normal tissue that makes up the valve between the right sides of your heart has stiffened."
  - B) "Your mitral valve isn't opening up enough for blood to flow into the part of your heart that sends blood into circulation."
  - C) "Your heart's mitral valve isn't closing properly so blood is flowing backward in your heart and eventually into your lungs."
  - D) "The valve between your left ventricle and left atria is infected and isn't allowing enough blood through."

Ans: B

**Feedback:**

Mitral valve stenosis represents the incomplete opening of the mitral valve during diastole with left atrial distention and impaired filling of the left ventricle. It does not exist in the right side of the heart, and the problem is associated primarily with improper ventricular filling and with pulmonary backflow only secondarily. Although it is often caused by infection, it is not an infectious process of the valve per se.

19. A 66-year-old client's echocardiogram report reveals a hypertrophied left ventricle. The health care provider suspects the client has aortic stenosis. Which of the following clinical manifestations would be observed if this client has aortic stenosis? Select all that apply.

- A) Decrease in exercise tolerance
- B) Exertional dyspnea
- C) Palpitations
- D) Syncope
- E) Heartburn

Ans: A, B, D

**Feedback:**

Because of the slow onset of aortic valve stenosis, the heart is able to compensate by hypertrophying and may still maintain a normal chamber volume and ejection fraction. As the stenosis progresses, the patient will experience classic symptoms of angina, syncope, heart failure, and decrease in exercise tolerance or exertional dyspnea. Palpitations and heartburn are not usually noted with aortic stenosis.

20. Which of the following situations related to transition from fetal to perinatal circulation would be most likely to necessitate medical intervention?

- A) Pressure in pulmonary circulation and the right side of the infant's heart fall markedly.
- B) Alveolar oxygen tension increases causing reversal of pulmonary vasoconstriction of the fetal arteries.
- C) Systemic vascular resistance and left ventricular pressure are both increasing.
- D) Pulmonary vascular resistance, related to muscle regression in the pulmonary arteries, rises over the course of the infant's first week.

Ans: D

**Feedback:**

One of the hallmarks of the transition from placental circulation is a rapid and then steady decrease in pulmonary vascular resistance. Answers A, B, and C relate normal physiological processes.



21. A pediatric nurse is assessing a newborn diagnosed with persistent patency of the ductus arteriosus. Which of the following findings are associated with this heart defect? Select all that apply.

- A) Murmur heard at the second intercostal space, during both systole and diastole
- B) BP 84/30 classified as a wide pulse pressure
- C) Shortness of breath with activity such as kicking
- D) Stridor with inspiratory wheezes
- E) Bulging jugular neck veins

Ans: A, B

**Feedback:**

Persistent patency of the ductus arteriosus is defined as a duct that remains open for greater than 3 months. A murmur is detected within days of birth. It is loudest at the second left intercostal space and is continuous through systole and diastole. A wide pulse pressure is common (BP 84/30). Most newborns have an elevated respiratory rate with exertional activity. Stridor is usually associated with bronchial infections or narrowing of the airways. Bulging jugular neck veins are associated with right-sided heart failure.

22. A nurse who works on a pediatric cardiology unit of a hospital is providing care for an infant with a diagnosis of tetralogy of Fallot. Which of the following pathophysiologic results should the nurse anticipate?

- A) There is a break in the normal wall between the right and left atria that results in compromised oxygenation.
- B) The aortic valve is stenotic, resulting in increased afterload.
- C) Blood outflow into the pulmonary circulation is restricted by pulmonic valve stenosis.
- D) The right ventricle is atrophic as a consequence of impaired myocardial blood supply.

Ans: C

**Feedback:**

Tetralogy of Fallot is marked by obstruction or narrowing of the pulmonary outflow channel, including pulmonic valve stenosis, a decrease in the size of the pulmonary trunk, or both. The characteristic septal defect is ventricular, not atrial. Aortic valve stenosis and right ventricular atrophy are not associated with the diagnosis.

## Chapter 27-b- Heart Failure and Circulatory Shock

1. A 66-year-old obese man with diagnoses of ischemic heart disease has been diagnosed with heart failure that his care team has characterized as attributable to systolic dysfunction. Which of the following assessment findings is inconsistent with his diagnosis?
- A) His resting blood pressure is normally in the range of 150/90, and an echocardiogram indicates his ejection fraction is 30%.
  - B) His end-diastolic volume is higher than normal, and his resting heart rate is regular and 82 beats/minute.
  - C) He is presently volume overloaded following several days of intravenous fluid replacement.
  - D) Ventricular dilation and wall tension are significantly lower than normal.

Ans: D

**Feedback:**

Systolic dysfunction is associated with increased ventricular dilation and wall tension. Hypertension, low ejection fraction, high preload, and volume overload are all commonly associated with systolic dysfunction.

2. A nurse will be providing care for a female patient who has a diagnosis of heart failure that has been characterized as being primarily right sided. Which of the following statements best describes the presentation that the nurse should anticipate? The client
- A) has a distended bladder, facial edema, and nighttime difficulty breathing.
  - B) complains of dyspnea and has adventitious breath sounds on auscultation (listening).
  - C) has pitting edema to the ankles and feet bilaterally, decreased activity tolerance, and occasional upper right quadrant pain.
  - D) has cyanotic lips and extremities, low urine output, and low blood pressure.

Ans: C

**Feedback:**

Right-sided failure is associated with peripheral edema, fatigue, and, on occasion, upper right quadrant pain. Abdominal distention can occur with right-sided failure when the liver becomes engorge. Facial edema, pulmonary edema, peripheral cyanosis, low urine output, and low blood pressure are less associated with right-sided failure. Left-sided failure is primarily associated with pulmonary signs and symptoms like dyspnea, pulmonary edema, frothy pink sputum, and respiratory congestion.

3. An 81-year-old male resident of a long-term care facility has a long-standing diagnosis of heart failure. Which of the following short-term and longer-term compensatory mechanisms are least likely to decrease the symptoms of his heart failure?
- A) An increase in preload via the Frank-Starling mechanism
  - B) Sympathetic stimulation and increased serum levels of epinephrine and norepinephrine
  - C) Activation of the renin–angiotensin–aldosterone system and secretion of brain natriuretic peptide (BNP)
  - D) AV node pacemaking activity and vagal nerve suppression

Ans: D

**Feedback:**

Reassignment of cardiac pacemaking activities and suppression of the vagal nerve are not noted compensatory actions related to heart failure. Increased preload and sympathetic stimulation, increased levels of epinephrine and norepinephrine, and activation of the renin–angiotensin–aldosterone system and secretion of brain natriuretic peptide (BNP) are all noted compensatory mechanisms.

4. The nurse working in the ICU knows that chronic elevation of left ventricular end-diastolic pressure will result in the patient displaying which of the following clinical manifestations?
- A) Chest pain and intermittent ventricular tachycardia
  - B) Dyspnea and crackles in bilateral lung bases
  - C) Petechia and spontaneous bleeding
  - D) Muscle cramping and cyanosis in the feet

Ans: B

**Feedback:**

Although it may preserve the resting cardiac output, the resulting chronic elevation of left ventricular end-diastolic pressure is transmitted to the atria and the pulmonary circulation, causing pulmonary congestion.

5. A 77-year-old patient with a history of coronary artery disease and heart failure has arrived in the emergency room with a rapid heart rate and feeling of “impending doom.” Based on pathophysiologic principles, the nurse knows the rapid heart rate could
- A) decrease renal perfusion and result in the development of ascites.
  - B) be a result of catecholamines released from SNS that could increase the myocardial oxygen demand.
  - C) desensitize the  $\alpha$ -adrenergic receptors leading to increase in norepinephrine levels.
  - D) prolong the electrical firing from the SA node resulting in the development of a heart block.

Ans: B

**Feedback:**

An increase in sympathetic activity by stimulation of the  $\beta$ -adrenergic receptors of the heart leads to tachycardia, vasoconstriction, and arrhythmias. Acutely, tachycardia significantly increases the workload of the heart, thus increasing myocardial  $O_2$  demand and leading to cardiac ischemia, myocyte damage, and decreased contractility. Decreased renal perfusion would activate the RAA system, increasing heart rate and BP further. Ventricular arrhythmias are primarily seen at this stage of HF.

6. A nurse educator in a geriatric medicine unit of a hospital is teaching a group of new graduates specific assessment criteria related to heart failure. Which of the following assessment criteria should the nurses prioritize in their practice?
- A) Measurement of urine output and mental status assessment
  - B) Pupil response and counting the patient's apical heart rate
  - C) Palpation of pedal (foot) pulses and pain assessment
  - D) Activity tolerance and integumentary inspection

Ans: A

**Feedback:**

Both increased and decreased urine output can be markers of heart failure, as can changes in mental status not attributable to other factors. While heart auscultation, pedal pulses, and activity tolerance are relevant parameters, integumentary inspection, pupil response, and pain assessment are less likely to be relevant assessment components.

7. Mr. V. has been admitted for exacerbation of his chronic heart failure (HF). When the nurse walks into his room, he is sitting on the edge of the bed, gasping for air, and his lips are dusky blue. Vital signs reveal heart rate of 112, respiratory rate of 36, and pulse oximeter reading of 81%. He starts coughing up frothy pink sputum. The priority intervention is to
- A) have medical supply department bring up suction equipment.
  - B) apply oxygen via nasal cannula at 3 lpm.
  - C) page the respiratory therapist to come give him a breathing treatment.
  - D) call for emergency assistance utilizing hospital protocol.

Ans: D

**Feedback:**

Mr. V. is experiencing acute pulmonary edema. This is a life-threatening condition. The person is seen sitting and gasping for air. The pulse is rapid, the skin is moist, and the lips/nail beds are cyanotic. Dyspnea and air hunger are accompanied by productive cough with frothy and often blood-tinged sputum (pink). The patient needs the emergency responder team (including ICU nurses, physicians, respiratory therapist, etc.) to intervene. Applying O<sub>2</sub> by mask will not increase his oxygen level fast enough, and he is probably mouth breathing (gasping for air). Suction equipment may be needed, but getting a physician to give orders for diuretics and inotropic medications is the priority. Of course respiratory therapist will arrive with the emergency assistance team.

8. A female older adult client has presented with a new onset of shortness of breath, and her physician has ordered measurement of her brain natriuretic peptide (BNP) levels along with other diagnostic tests. What is the most accurate rationale for the physician's choice of blood work?
- A) BNP is released as a compensatory mechanism during heart failure, and measuring it can help differentiate the client's dyspnea from a respiratory pathology.
  - B) BNP is an indirect indicator of the effectiveness of the renin-angiotensin-aldosterone (RAA) system in compensating for heart failure.
  - C) BNP levels correlate with the client's risk of developing cognitive deficits secondary to heart failure and consequent brain hypoxia.
  - D) BNP becomes elevated in cases of cardiac asthma, Cheyne-Stokes respirations, and acute pulmonary edema, and measurement can gauge the severity of pulmonary effects.

Ans: A

**Feedback:**

BNP is released to compensate for heart failure, and elevated levels help confirm the diagnosis of heart failure as opposed to respiratory etiologies. It does not measure the effectiveness of the RAA system, the risk of cognitive deficits, or the specific severity of pulmonary symptoms of heart failure.

9. A nurse is administering morning medications to a number of patients on a medical unit. Which of the following medication regimens is most suggestive that the patient has a diagnosis of heart failure?

A) Antihypertensive, diuretic, antiplatelet aggregator  
B) Diuretic, ACE inhibitor, beta-blocker  
C) Anticoagulant, antihypertensive, calcium supplement  
D) Beta-blocker, potassium supplement, anticoagulant

Ans: B

**Feedback:**

Diuretics, ACE inhibitors, and beta-blockers are all commonly used in the treatment of heart failure. Antiplatelet aggregators, calcium and potassium supplements, and anticoagulants are less likely to relate directly to a diagnosis of heart failure.

10. Emergency medical technicians respond to a call to find an 80-year-old man who is showing signs and symptoms of severe shock. Which of the following phenomena is most likely taking place?

A) The man's  $\alpha$ - and  $\beta$ -adrenergic receptors have been activated, resulting in vasoconstriction and increased heart rate.  
B) Hemolysis and blood pooling are taking place in the man's peripheral circulation.  
C) Bronchoconstriction and hyperventilation are initiated as a compensatory mechanism.  
D) Intracellular potassium and extracellular sodium levels are rising as a result of sodium-potassium pump failure.

Ans: A

**Feedback:**

$\alpha$ - and  $\beta$ -adrenergic receptor activation is a central response to all types of shock. Hemolysis is not a noted accompaniment to shock. Bronchodilation, not bronchoconstriction, often results from adrenergic stimulation, and sodium-potassium pump failure results in increased extracellular potassium and intracellular sodium.

11. Following coronary bypass graft (CABG) surgery for a massive myocardial infarction (MI) located on his left ventricle, the ICU nurses are assessing for clinical manifestations of cardiogenic shock. Which of the following assessment findings would confirm that the client may be in the early stages of cardiogenic shock? Select all that apply.

- A) Decreasing mean arterial pressure (MAP)
- B) Low BP reading of 86/60
- C) Urine output of 15 mL last hour
- D) Low pulmonary capillary wedge pressure (PCWP)
- E) Periods of confusion

Ans: A, B, C, E

**Feedback:**

Signs and symptoms of cardiogenic shock include indications of hypoperfusion with hypotension (BP 96/60), decrease in mean arterial pressure (MAP) due to poor stroke volume, and a narrow pulse pressure. Urine output decreases because of lower renal perfusion pressures. PCWP is usually elevated due to increased preload. Periods of confusion or altered cognition/consciousness may occur because of low cardiac output.

12. A 22-year-old male is experiencing hypovolemic shock following a fight in which his carotid artery was cut with a broken bottle. What immediate treatments are likely to most benefit the man?

- A) Resolution of compensatory pulmonary edema and heart arrhythmias
- B) Infusion of vasodilators to foster perfusion and inotropes to improve heart contractility
- C) Infusion of normal saline or Ringer lactate to maintain the vascular space
- D) Administration of oxygen and epinephrine to promote perfusion

Ans: C

**Feedback:**

Maintenance of vascular volume is the primary goal in the treatment of hypovolemic shock and can be achieved in the short term through intravenous administration of saline or Ringer lactate. Resolution of pulmonary edema and heart arrhythmias and infusion of vasodilators are associated with treatment of cardiogenic shock, while oxygen and epinephrine would address anaphylactic shock.

13. A 30-year-old woman presents at a hospital after fainting at a memorial service, and she is diagnosed as being in neurogenic shock. Which of the following signs and symptoms is she most likely to display?

A) Faster than normal heart rate  
B) Pain  
C) Dry and warm skin  
D) Increased thirst

Ans: C

**Feedback:**

In contrast to hypovolemic shock, in which the heart rate is faster than normal and the skin is cold and clammy, a person in neurogenic shock is likely to have a slower than normal heart rate and dry, warm skin. Fainting due to emotional causes is a transient form of neurogenic shock, while increased thirst is an early sign of hypovolemic shock.

14. All of the following interventions are ordered stat. for a patient stung by a bee who is experiencing severe respiratory distress and faintness. Which priority intervention will the nurse administer first?

A) Epinephrine (Adrenalin)  
B) Normal saline infusion  
C) Dexamethasone (Decadron)  
D) Diphenhydramine (Benadryl)

Ans: A

**Feedback:**

Treatment includes immediate discontinuation of the inciting agent; close monitoring of CV and respiratory function; and maintenance of respiratory gas exchange, cardiac output, and tissue perfusion. Epinephrine is given in an anaphylactic reaction because it constricts blood vessels and relaxes the smooth muscle in the bronchioles.

15. A patient in the intensive care unit has a blood pressure of 87/39 and has warm, flushed skin accompanying his sudden decline in level of consciousness. The patient also has arterial and venous dilatation and a decrease in systemic vascular resistance. What is this client's most likely diagnosis?

A) Hypovolemic shock  
B) Septic shock  
C) Neurogenic shock  
D) Obstructive shock

Ans: B

**Feedback:**

Low blood pressure accompanied by warm, flushed skin and cognitive changes is indicative of septic shock, as is vessel dilatation and decreased vascular resistance.



16. A client has many residual health problems related to compromised circulation following recovery from septic shock. The nurse knows that which of the following complications listed below are a result of being diagnosed with septic shock and therefore should be assessed frequently? Select all that apply.
- A) Profound dyspnea due to acute respiratory distress syndrome
  - B) Atelectasis resulting in injury to endothelial lining of pulmonary vessels, which allows fluid/plasma to build up in alveolar spaces
  - C) Formation of plaque within vessels supplying blood to the heart causing muscle damage and chest pain
  - D) Acute renal failure due to decreased/impaired renal perfusion as a result of low BP
  - E) Flushed skin and pounding headache that coincides with each heart beat

Ans: A, B, D

**Feedback:**

ARDS, atelectasis, and acute renal failure are all noted consequences of shock that might be, respectively, treated by dialysis, an ostomy, or platelet transfusion. Plaque formation to heart vessels is not directly related to any of the identified consequences of shock. Pounding headache that coincides with each heart beat may occur with migraine headaches.

17. A 3-year-old child with right-sided heart failure has been admitted for worsening of his condition. Which of the following assessments would be considered one of the earliest signs of systemic venous congestion in this toddler?
- A) Breathlessness with activity
  - B) Excessive crying
  - C) Enlargement of the liver
  - D) Increased urine output

Ans: C

**Feedback:**

With RV function impaired, systemic venous congestion develops. Hepatomegaly due to liver congestion often is one of the first signs on systemic venous congestion in infants and children.

18. A pediatrician is teaching a group of medical students about some of the particularities of heart failure in children as compared with older adults. Which of the physician's following statements best captures an aspect of these differences?
- A) "You'll find that in pediatric patients, pulmonary edema is more often interstitial rather than alveolar, so you often won't hear crackles."
  - B) "Because of their higher relative blood volume, jugular venous distention is a better assessment technique for suspected heart failure in young patients."
  - C) "Signs and symptoms in children may sometimes mimic those of shock, with a low blood pressure and high heart rate."
  - D) "Fever is a sign of heart failure in children that you are unlikely to see in older adults."

Ans: A

**Feedback:**

The pulmonary edema that accompanies heart failure is more often interstitial rather than alveolar in children. Jugular venous distention is difficult to gauge in children, and low blood pressure and fever are not noted signs of heart failure in children.

19. Which of the following changes associated with aging contributes to heart failure development in older adults? Select all that apply.
- A) Increased incidence of mitral stenosis
  - B) Sludge buildup in the kidneys
  - C) Elevated diastolic BP
  - D) Increased vascular stiffness
  - E) Inflammation in the joints due to arthritis

Ans: C, D

**Feedback:**

Changes with aging contribute to the development of HF in older adults. First is reduced responsiveness to  $\beta$ -adrenergic stimulation. Second is increased vascular stiffness that contributes to ventricular hypertrophy. Third, the heart itself becomes less compliant with age. Fourth relates to altered myocardial metabolism at the level of the mitochondria. Older adults usually develop aortic stenosis and mitral regurgitation. Kidney stones do not contribute to HF. Increase in diastolic pressure compromises LV filling leading to increases in pressures predisposing to HF. Arthritis is not associated with heart failure.

20. Knowing the high incidence and prevalence of heart failure among the elderly, the manager of a long-term care home has organized a workshop on the identification of early signs and symptoms of heart failure. Which of the following teaching points is most accurate?
- A) "Displays of aggression, confusion, and restlessness when the resident has no history of such behavior can be a sign of heart failure."
  - B) "Heart failure will often first show up with persistent coughing and lung crackles."
  - C) "Residents in early heart failure will often be flushed and have warm skin and a fever."
  - D) "Complaints of chest pain are actually more often related to heart failure than to myocardial infarction."

Ans: A

**Feedback:**

Cognitive changes can often accompany heart failure in the elderly. Pulmonary edema is a later sign, and they are less likely to display coughing, chest pain or flushed skin, and fever.

## Chapter 28- Disorders of Cardiac Conduction and Rhythm

1. A physician has ordered the measurement of a cardiac patient's electrolyte levels as part of the client's morning blood work. Which of the following statements best captures the importance of potassium in the normal electrical function of the patient's heart?
- A) Potassium catalyzes the metabolism of ATP, producing the gradient that results in electrical stimulation.
  - B) Potassium is central to establishing and maintaining the resting membrane potential of cardiac muscle cells.
  - C) The impermeability of cardiac cell membranes to potassium allows for action potentials achieved by the flow of sodium ions.
  - D) The reciprocal movement of one potassium ion for one sodium ion across the cell membrane results in the production of an action potential.

Ans: B

**Feedback:**

The selective permeability of cell membranes to potassium, and its near-impermeability to sodium ions, produces the resting membrane potential of cardiac cells. Potassium does not catalyze the metabolism of ATP, and sodium and potassium ions do not move across the cell membrane in a 1:1 ratio.

2. Which of the following statements describes phase 4 of the action potential of cells in the sinoatrial (SA) node?
- A) A slow depolarization occurs when  $\text{Na}^+$  is transported out of the cell and  $\text{K}^+$  moves back in, resulting in resting membrane potential.
  - B) The cells are capable of responding to a greater than normal stimulus before the resting membrane potential is reached.
  - C) The fast sodium channels in the cellular membranes close, causing an abrupt decrease in intracellular positivity.
  - D) Potassium permeability is allowing the cell membrane to remain depolarized, and  $\text{Ca}^{2+}$  channel opens moving  $\text{Ca}^{2+}$  back into the cell.

Ans: A

**Feedback:**

During phase 4 in the cells of the SA node, a slow leakage of current through the slow channels of the cellular membrane leads to spontaneous depolarization; this slow response enables pacemaker function. Answer B describes the relative refractory period of the action potential curve, which occurs at the end of phase 3 in cardiac cells, and answer C describes phase 1 of the action potential, which signals the end of depolarization. The sodium-potassium pump transports sodium out of the cell and a smaller amount of potassium into it, contributing to the negative intracellular charge of the resting membrane potential in phase 4.

3. An ECG technician is placing leads on a patient who has presented to the emergency department with a sudden onset of chest pain. The technician would recognize which of the following facts about the placement of leads and the achievement of a clinically accurate ECG?

A) The electrical potential recorded by a lead on an extremity will vary significantly depending on where the lead is placed on the extremity.  
B) The chest leads measure electrical activity on the horizontal plane, while limb leads measure it on the vertical plane.  
C) Limb leads measure the electrical activity of the heart indirectly through the activity of adjacent skeletal muscle.  
D) A total of 12 chest leads are necessary to attain the most accurate ECG.

Ans: B

**Feedback:**

A complete ECG is obtained by combining data from chest leads, which measure activity on the horizontal plane, and limb leads, corresponding to the vertical or frontal plane. The electrical potential recorded by a lead on an extremity should not vary significantly depending on where the lead is placed on the extremity, and limb leads do not measure electrical activity by way of skeletal muscle activity. A total of 12 leads, only six of which are on the chest, are necessary for a complete ECG.

4. The cardiologist just informed a patient that he has a reentry circuit in the electrical conduction system in his heart. This arrhythmia is called Wolff-Parkinson-White (WPW) syndrome. After the physician has left the room, the patient asks the nurse to explain this to him. Which of the following statements most accurately describes what is happening?

A) "This means that the SA node (which is the beginning of your heart's electrical system) has been damaged and is no longer functioning normal."  
B) "You must have a large clot in one of your arteries that supply oxygenated blood to the special conduction cells in your heart."  
C) "There is an extra, abnormal electrical pathway in the heart that leads to impulses traveling around the heart very quickly, in a circular pattern, causing the heart to beat too fast."  
D) "For some reason, your electrical system is not on full charge, so they will have to put in new leads and a pacemaker to make it work better."

Ans: C

**Feedback:**

There are several forms of reentry. The first is anatomic reentry. It involves an anatomic obstacle around which the circulating current must pass and results in an excitation wave that travels in a set pathway. Arrhythmias that arise as a result of anatomic reentry are paroxysmal supraventricular tachycardias, as seen in WPW syndrome, atrial fibrillation, atrial flutter, etc. Answer choice A relates to sinus node arrhythmias and SSS. Answer choice B relates to arrhythmias caused by MI. Answer choice D relates to third-degree block or ventricular standstill, for example.

5. A 68-year-old male complains to his family physician that when he tests his blood pressure using a machine at his pharmacy, his heart rate is nearly always very low. At other times, he feels that his heart is racing, and it also seems to pause at times. The man has also had occasionally light-headedness and a recent syncopal episode. What is this client's most likely diagnosis and the phenomenon underlying it?
- A) Sick sinus syndrome as a result of a disease of his sinus node and atrial or junctional arrhythmias
  - B) Ventricular arrhythmia as a result of alternating vagal and sympathetic stimulation
  - C) Torsade de pointes as a result of disease of the bundle of His
  - D) Premature atrial contractions that vacillate between tachycardic and bradycardic episodes as a consequence of an infectious process

Ans: A

**Feedback:**

The client's alternating bradycardic and tachycardic episodes are indicative of sick sinus syndrome. This pattern is not characteristic of ventricular arrhythmia, premature atrial contractions, or torsade de pointes.

6. A 6-year-old boy has been brought to the emergency department by ambulance after his mother discovered that his heart rate was "so fast I couldn't even count it." The child was determined to be in atrial flutter, and his mother is seeking an explanation from the health care team. Which of the following points should underlie an explanation to the mother?
- A) The child is experiencing a reentry rhythm in his right atrium.
  - B) The resolution of the problem is dependent on spontaneous recovery and is resistant to pacing interventions.
  - C) The child is likely to have a normal ECG apart from the rapid heart rate.
  - D) The boy's atria are experiencing abnormal sympathetic stimulation.

Ans: A

**Feedback:**

Atrial flutter is caused by a reentry rhythm that is located in the right atrium. It is normally responsive to pacing. His ECG will appear highly irregular, and the problem does not originate from sympathetic stimulation.

7. A nurse educator is teaching a group of nurses at a long-term care facility about atrial fibrillation in light of its prevalence in older adults. Which of the following statements by the nurses would the educator most want to correct?
- A) "The electrical impulses go in chaotic directions, and so the atria can't contract properly."
  - B) "An ECG of someone in atrial fibrillation would be almost random in appearance."
  - C) "The contraction of the ventricles and the atria can range from 400 to 600 beats/minute."
  - D) "It can be hard to measure at the bedside because not all ventricular beats make a palpable pulse."

Ans: C

**Feedback:**

While atrial contraction can range from 400 to 600 beats/minute, ventricular contraction is normally in the range of 80 to 180 beats/ minute during atrial fibrillation. The electrical impulses do go in chaotic, inappropriate directions, and the ECG can appear random. Measurement can be challenging because of the lack of pulses corresponding to all ventricular contractions.

8. A medical student is working with a 61-year-old male client in the hospital who has presented with a new onset of atrial fibrillation. Which of the following courses of treatment will the student most likely expect the attending physician to initiate?
- A) Immediate cardioversion followed by surgery to correct the atrial defect
  - B) Anticoagulants and beta-blockers to control rate
  - C) Antihypertensives and constant cardiac monitoring in a high acuity unit
  - D) Diuretics, total bed rest, and cardioversion if necessary

Ans: B

**Feedback:**

Atrial fibrillation is most often treated with anticoagulants to prevent embolic events as well as beta-blockers and digoxin. Cardioversion would not be a first-line intervention, and antihypertensives and diuretics would be unlikely treatments of choice.

9. A 63-year-old male client has been diagnosed with a bundle branch block. How will this client's care team most likely expect his condition to be expressed diagnostically?
- A) His AV node will be performing the primary pacemaker role due to inadequacy of the SA node.
  - B) His ECG will show a flattened P wave as a result of impaired atrial depolarization.
  - C) Conduction from the Purkinje fibers to the bundle branches is compromised by inadequate conduction.
  - D) His ECG will show an inordinately wide QRS complex because impulses are bypassing the normal conduction tissue.

Ans: D

**Feedback:**

Because impulses must pass through muscle tissue rather than specialized conduction tissue, the client's QRS complex will be wide. His SA node is unlikely to be defective, and the client's P wave is not likely to be abnormal on an ECG. Conduction takes place from the bundle branches to the Purkinje fibers rather than vice versa.

10. Which of the following patients should the nurse be assessing for long QT syndrome?
- A) A 95-year-old patient with Alzheimer's who is having periods of apnea
  - B) A 32-year-old male admitted for cocaine overdose with long history of illicit drug abuse
  - C) A 56-year-old female admitted for total hysterectomy due to excessive bleeding and clotting
  - D) A 68-year-old male who was in a car accident with sternal bruising and fractured femur

Ans: B

**Feedback:**

Acquired LQTS has been linked to a variety of conditions, including cocaine use, exposure to organophosphorous compounds, electrolyte imbalances, marked bradycardia, MI, SAH, HIV, and protein-sparing fasting.



11. A number of patients in an acute cardiac care unit of a hospital have diagnoses of impaired cardiac conduction. Which of the following patients is most deserving of immediate medical attention?
- A) A 46-year-old man whose cardiac telemetry shows him to be in ventricular tachycardia
  - B) A 69-year-old woman who has entered ventricular fibrillation
  - C) A 60-year-old man with premature ventricular contractions (PVC) and a history of atrial fibrillation
  - D) A 60-year-old woman who has just been diagnosed with a first-degree AV block

Ans: B

**Feedback:**

Ventricular fibrillation, or ventricular flutter, is a life-threatening emergency that would necessitate immediate intervention. Ventricular tachycardia is also a serious condition but less so than ventricular fibrillation. PVCs and a first-degree AV block would not normally require emergency intervention.

12. A 71-year-old man is slated for pacemaker insertion for treatment of a third-degree AV block. The man's nurse has been educating him about his diagnosis and treatment and answering the numerous questions he has about his health problem. Which of the following teaching points should the nurse include in this patient teaching?
- A) "This is almost certainly a condition that you were actually born with, but that is just now becoming a serious problem."
  - B) "Because the normal electrical communication is lacking, the bottom parts of your heart are beating especially fast to compensate for inefficiency."
  - C) "The root problem is that the top chambers of your heart and the bottom chambers of your heart aren't coordinating to pump blood efficiently."
  - D) "If left untreated, this would have put you at great risk of stroke or heart attack."

Ans: C

**Feedback:**

A third-degree AV block is characterized by independent, and thus uncoordinated, pacemaker action for the atria and for the ventricles. It can be either congenital or acquired, and ventricular contraction tends to be slow, not fast. Manifestations tend to be those associated with decreased cardiac output, and a third-degree AV block is not necessarily associated with a large increase in stroke or MI risk.

13. A 72-year-old woman with a recent onset of syncopal episodes has been referred to a cardiologist by her family physician. As part of the client's diagnostic workup, the cardiologist has ordered her to wear a Holter monitor for 24 hours. Which of the following statements best captures an aspect of Holter monitoring?
- A) A Holter monitor is preferable to standard ECG due to its increased sensitivity to cardiac electrical activity.
  - B) The primary goal is to allow the cardiologist to accurately diagnose cardiomyopathies.
  - C) Accurate interpretation of the results requires correlating the findings with activity that the woman was doing at the time of recording.
  - D) Holter monitors are normally set to record electrical activity of the heart at least once per hour.

Ans: C

**Feedback:**

It is imperative that activity level be correlated with Holter monitor results in order to draw accurate diagnostic conclusions. It is the long-term gathering of data, rather than sensitivity or accuracy that gives Holter monitoring an advantage over standard ECG measurement. The goal is to diagnose arrhythmias, not cardiomyopathies. The hallmark of Holter monitoring is its continuous, rather than intermittent, measurement.

14. A 31-year-old woman with a congenital heart defect reports episodes of light-headedness and syncope, with occasional palpitations. A resting electrocardiogram reveals sinus bradycardia, and she is suspected to have sick sinus syndrome. Which of the following diagnostic methods is the best choice to investigate the suspicion?
- A) Signal-averaged ECG
  - B) Exercise stress testing
  - C) Electrophysiologic study
  - D) Holter monitoring

Ans: D

**Feedback:**

Because sick sinus syndrome frequently involves intermittent or alternating types of arrhythmias, Holter monitoring, which can record changes in rhythm that occur over a period of up to 48 hours, is likely to provide the best picture of the spectrum of cardiac changes in any particular client. Signal-averaged ECG is most useful for identifying specific arrhythmias that may not be clear on traditional surface ECG. Exercise stress testing measures changes in rhythm specifically in response to exercise.

Electrophysiologic studies are used diagnostically to determine a person's potential for arrhythmia formation.

15. Following electrophysiological testing that included ablation therapy, the nurse should be assessing the patient for which complication that may occur postprocedure?
- A) Complaints of nausea and spitting up bile-looking secretions along with stomach cramps
  - B) Sudden onset of dyspnea, tachypnea, and chest pain of a “pleuritic” nature (worsened by breathing)
  - C) Bleeding from the nose that requires packing, excessive swallowing of mucus, and coughing
  - D) Complaints of heart palpitations, frequent PVCs noted on monitor, and substernal chest pain

Ans: B

**Feedback:**

Following EPS that included an ablation, the procedure increases the risk of complications, which include venous thrombosis and pulmonary emboli. Answer choice B refers to s/s of pulmonary emboli. Answer choice A refers to GI symptoms, which are not associated with EPS. Answer choice C refers that this procedure does not place a tube down the nose/throat. Answer choice D refers that EPS usually does not involve the left side of the heart; therefore, the risk of MI is minimal.

16. A nurse who provides care in a geriatric subacute medicine unit of a hospital has noted that a large number of patients receive  $\beta$ -adrenergic blocking medications such as metoprolol. Which of the following statements best conveys an aspect of the use of beta-blockers?
- A) They can be used to treat supraventricular arrhythmias and decrease automaticity by depressing phase 4 of the action potential.
  - B) They inhibit the potassium current and repolarization, extending the action potential and refractoriness.
  - C) They counteract arrhythmias and tachycardias by increasing vagal stimulation.
  - D) They decrease myocardial oxygen demand by blocking the release of intracellular calcium ions.

Ans: A

**Feedback:**

Beta-blockers are often used in the treatment of supraventricular arrhythmias, and they decrease automaticity by depressing phase 4 of the action potential. They do not inhibit the potassium current and repolarization, nor do they cause vagal stimulation or block the release of intracellular calcium.

17. A patient, who is experiencing some angina associated with atrial tachycardia, has been placed on verapamil (Calan), a calcium channel blocker. Knowing that this medication blocks the slow calcium channels, thereby depressing phase 4 and lengthening phases 1 and 2 action potential, the nurse should assess this patient for which of the following adverse reactions?

- A) Bradycardia
- B) Ventricular tachycardia
- C) Sudden cardiac death
- D) Increased cardiac output

Ans: A

**Feedback:**

Calcium channel blockers (CCB) are used to slow the SA node pacemaker and inhibit conduction in the AV node, slowing the ventricular response in atrial tachycardias. Therefore, the nurse should be aware that it may cause bradycardia. CCB are not known to cause VT or sudden death. These medications reduce the force of myocardial contractility, thereby decreasing myocardial O<sub>2</sub> demand. They do not increase cardiac output.

18. A 70-year-old woman with ongoing severe atrial fibrillation is scheduled for defibrillation. What is an aspect of the rationale and physiology of defibrillation treatment?

- A) Interruption of disorganized impulses by the current allows the AV node to readopt its normal pacemaker role.
- B) Defibrillation can be achieved using either a transcutaneous or transvenous pacemaker.
- C) Defibrillation must be coincided with the R wave of the ECG in order to be successful.
- D) The goal is to depolarize the entire heart during the passage of current.

Ans: D

**Feedback:**

The benefits of defibrillation are achieved by depolarizing the heart during the passage of current, allowing the SA node to regain control. It is not achieved by the use of a pacemaker, and cardioversion, not defibrillation, is coincided with the R wave.

19. A patient with a new automatic implantable cardioverter–defibrillator (AICD) asks the nurse what happens if he goes into that deadly heart rhythm again. The nurse will base her response knowing that the AICD will
- A) periodically fire just to test for lead placement and battery life.
  - B) respond to ventricular tachyarrhythmia by delivering a shock within 10 to 20 seconds of its onset.
  - C) use radiofrequency energy to deliver an electrical shock through the site where the lethal rhythm originates.
  - D) remove scar tissue and aneurysm during placement of electrodes and then will shock if paradoxical ventricular movement is located.

Ans: B

**Feedback:**

AICD successfully treats individuals with life-threatening ventricular tachyarrhythmias by use of intrathoracic electrical countershock. It senses and detects ventricular dysrhythmias. It responds by delivering an electrical shock between intrathoracic electrodes within 10 to 20 seconds of its onset. It does not periodically fire to test lead placement. It does not utilize radiofrequency energy (this is used in ablations). The procedure does not remove scar tissue or aneurysms. This is a ventriculotomy.

20. Assuming that they have not responded to drug therapy, which of the following clients is likely to be the best candidate for surgical cardiac ablation?
- A) A 62-year-old woman with peripheral vascular disease who has experienced multiple episodes of torsade des pointes
  - B) A 75-year-old man with diabetes but no previous heart disease that suddenly develops syncope due to sick sinus syndrome
  - C) A 46-year-old man with unstable angina and a history of myocardial infarction who is found to have long QT syndrome and episodes of frequent ventricular arrhythmias
  - D) A 22-year-old woman with an atrial septal defect who has recurrent paroxysmal atrial flutter with rapid ventricular rate associated with her caffeine intake.

Ans: C

**Feedback:**

Due to his history of MI, the 46-year-old man probably has several areas of necrotic tissue that are interfering with conduction and ventricular function and would probably benefit from having them removed. The 62-year-old woman may have little or no myocardial tissue damage, so a less invasive procedure to improve her cardiac circulation would be a better choice for her. The 75-year-old man may not have any areas of infarction and is a risky surgical candidate because of his age and diabetes. The 22-year-old woman's tachycardia is likely to be nonischemic in origin.

## Chapter 29- Structure and Function of the Respiratory System

1. As a result of dehydration, a client's epithelial cells are producing insufficient amounts of mucus. Consequently, the client's mucociliary blanket is compromised. Which of the following changes would the care provider anticipate as a direct result of this change?
  - A) Impaired function of the client's cilia
  - B) Decreased levels of oxygen saturation
  - C) Increased amounts of bacteria in the lungs
  - D) Increased carbon dioxide levels

Ans: C

**Feedback:**

The primary role of the mucociliary blanket is to trap foreign particles and bacteria and thus prevent their entry into the lungs. Impaired ciliary function may result in an inadequate mucociliary blanket, but the opposite relationship is unlikely. Decreased oxygen and increased carbon dioxide levels may eventually result, but not as a direct or immediate consequence.

2. A 21-year-old male client has suffered a head injury during a crash on his motorcycle, and a deficit that assessments have revealed is an impaired swallowing mechanism. He has also developed aspiration pneumonia. Which of the following statements most accurately captures an aspect of his condition?
  - A) His vocal folds are likely not performing their normal function.
  - B) His epiglottis is covering his larynx.
  - C) His vocal folds have been compromised.
  - D) His tracheobronchial tree is intermittently obstructed.

Ans: A

**Feedback:**

The vocal folds contribute to blocking of the airways during swallowing; compromise to this function is likely to allow food to enter the lungs. The epiglottis is performing its normal, protective role against aspiration when it covers the larynx, and the vocal folds contribute to sound enunciation, not swallowing or protection against aspiration. Tracheobronchial obstruction would not contribute to aspiration.

3. A male, lifetime smoker has died because of chronic obstructive pulmonary disease. Which of the following phenomena regarding his alveoli would his care team expect in the weeks prior to his death?
- A) Proliferation of natural killer (NK) cells in the alveolar lumen
  - B) Large numbers of alveolar macrophages in septal connective tissue
  - C) The presence of tubercles in the interalveolar spaces
  - D) Compensatory regeneration of type I alveolar cells

Ans: B

**Feedback:**

Smokers often retain large numbers of carbon-filled macrophages in their septal connective tissue. NK cell proliferation is not a noted phenomenon in the alveoli, and tubercles are associated specifically with tuberculosis infection. Type I alveoli are incapable of regeneration.

4. Reviewing pathology for an exam on pulmonary vasculature, the nursing student states that blood enters the right side of the heart via the vena cavae, then to the right atrium, right ventricle, and then which vessel carries the deoxygenated blood into the pulmonary system?
- A) Pulmonary capillaries
  - B) Pulmonary artery
  - C) Pulmonary vein
  - D) Ductus arteriosus

Ans: B

**Feedback:**

Deoxygenated blood leaves the right heart through the pulmonary artery. Return of oxygenated blood to the heart occurs by way of the pulmonary vein, which empties into the left atrium.

5. The nurse is hearing diminished breath sounds and a “grating” sound during respirations. This is consistent with excess collection of fluid in the pleural cavity. The medical term for this is
- A) pleurisy.
  - B) pleural effusion.
  - C) pneumothorax.
  - D) poor lung compliance.

Ans: B

**Feedback:**

Pleural effusion is used to describe an abnormal collection of fluid or exudates in the pleural cavity. Pleurisy is an inflammation in the pleural space, and pneumothorax is an abnormal collection of air in the pleural space.

6. Which of the following statements best conveys an aspect of the respiratory pressures that govern ventilation?
- A) Intrapleural pressure slightly exceeds that of the inflated lung.
  - B) The chest wall exerts positive pressure on the lungs that contributes to expiration.
  - C) The lungs are prevented from collapsing by constant positive intrapulmonary pressure.
  - D) Negative intrapleural pressure holds the lungs against the chest wall.

Ans: D

**Feedback:**

Negative intrapleural pressure holds the lungs in place against the chest wall and prevents their natural elastic properties from causing them to collapse. Intrapleural pressure is negative in relation to the inflated lung, and the chest wall exerts negative pressure on the lungs that keeps them from contracting and contributes to inspiration. Intrapulmonary pressure oscillates between positive and negative relative to atmospheric pressure with expiration and inspiration.

7. The emergency department is awaiting the arrival of a spinal cord–injured patient. Knowing the innervation of the diaphragm, a patient with which type of injury may be in need of immediate mechanical ventilation? Injury to the
- A) C4 area.
  - B) C7 area.
  - C) T1 area.
  - D) T4 area.

Ans: A

**Feedback:**

The diaphragm is the principal muscle of inspiration. It is innervated by the phrenic nerve roots, which arise from the cervical level of the spinal cord, mainly from C4 but also C3 and C5.

8. A client who presented with shortness of breath and difficulty climbing stairs has been diagnosed with pulmonary fibrosis, a disease characterized by scarring of the alveoli. Upon assessment of the lungs, what clinical manifestations should the nurse expect?
- A) Rapid, deep breaths
  - B) Wheezing throughout lung fields
  - C) Short, shallow breaths
  - D) Pursed-lip breaths with slow, steady breaths

Ans: C

**Feedback:**

Scarring diminishes the elasticity of the lung tissue, resulting in noncompliant lungs that are more difficult to inflate. In order to maintain a sufficient tidal volume and oxygen level with the lungs that require extra work to expand, the individual must take shallower, more rapid breaths. The effort and time required for him to breathe deeply would detract from his ability to bring in enough air.



9. A female patient is requiring supplementary oxygen by face mask due to her reduced lung compliance. Which of the following pathophysiological processes is most likely a contributor to her low lung compliance?

- A) The woman's lungs have more recoil than a healthy person's.
- B) Her type II alveolar cells are producing a slight excess of surfactant.
- C) Turbulent airflow is taking place in the patient's large airways.
- D) Her thoracic cage is less flexible than when she was healthy.

Ans: D

**Feedback:**

Impaired thoracic cage flexibility can be a contributor to reduced lung compliance. Increased recoil and a modest excess of surfactant would increase lung compliance, and turbulent flow in the airways is a normal, not pathological, finding.

10. While working in the newborn ICU, the nurses receive a call that an infant, gestational age of 23 weeks, is being air flighted to the level 3 trauma nursery. The priority intervention for this infant would be

- A) insertion of an umbilical line for fluids.
- B) intubation and mechanical ventilation.
- C) insertion of a feeding tube.
- D) insertion of an intraventricular catheter.

Ans: B

**Feedback:**

The type II alveolar cells that produce surfactant do not begin to mature until 26th to 27th week of gestation; consequently, many premature infants have difficulty in producing sufficient amounts of surfactant. This can lead to alveolar collapse and severe respiratory distress. The only answer (B) to facilitate respiratory is mechanical ventilation. IV fluids and nutrition are important but not a priority of airway/breathing problems. There is no indication that the infant has increased ICP and would need an intraventricular catheter.

11. A 60-year-old male hospital patient with a diagnosis of chronic obstructive pulmonary disease (COPD) is undergoing lung function tests to gauge the progression of his disease. Which of the following aspects of the lung volumes will the respiratory therapist be most justified in using to guide interpretation of the test results?
- A) Vital capacity will equal the patient's combined inspiratory reserve, expiratory reserve, and tidal volume.
  - B) Vital capacity will equal the total lung capacity.
  - C) Resting tidal volume will exceed that of tidal volume during activity.
  - D) Expiratory reserve will equal residual lung volume.

Ans: A

**Feedback:**

Vital capacity is determined by combining inspiratory reserve, expiratory reserve, and tidal volume. Total lung capacity always exceeds vital capacity, given that it is not possible to completely empty the lungs. Tidal volume becomes wider during exercise, and expiratory reserve is neither equal to nor synonymous with residual volume.

12. A 71-year-old woman is dependent on oxygen therapy and bronchodilators due to her diagnosis of emphysema. Which of the following pathological processes occur as a result of her emphysema? Select all that apply.
- A) Decreased elastic recoil due to alveolar damage
  - B) Decreased residual lung volume due to impaired alveolar ventilation
  - C) Increased anatomical dead space due to reduced tidal volume
  - D) Increased alveolar dead space due to incorrect intrapleural pressure

Ans: A, C, D

**Feedback:**

In lung pathology such as emphysema, large amounts of air are trapped at the end of a given breath, a situation that corresponds to increased residual volume and decreased vital capacity. Elastic recoil would tend to suffer, and both alveolar and anatomical dead space consequently increase.

13. The physician mentions the patient has developed alveolar dead space. The nurse recognizes that this means
- A) air that is moved in and out of the lungs with each breath.
  - B) air that cannot participate in gas exchange and remains in the main bronchus.
  - C) air is trapped in the conducting airways.
  - D) alveoli are ventilated but not perfused.

Ans: D

**Feedback:**

Alveolar dead space results from alveoli that are ventilated but not perfused.

14. Due to complications, a male postoperative patient has been unable to mobilize secretions for several days following surgery and develops atelectasis. Which of the following processes would his care team anticipate with relation to his health problem?
- A) Vasodilation in the alveolar vessels in the affected region of his lung
  - B) Increased workload for the left side of the patient's heart
  - C) Increased blood flow to the area of atelectasis
  - D) Directing blood flow away from the lung regions that are hypoxic

Ans: D

**Feedback:**

Regional hypoxia, such as with a diagnosis of atelectasis, is associated with vasoconstriction and redirection of blood away from, not toward, the affected area of the lung. This also contributes to an increased workload for the right side of the heart.

15. A 44-year-old woman has developed calf pain during a transatlantic flight. She is extremely short of breath upon arrival at her destination. She was subsequently diagnosed with a pulmonary embolism (PE) that resolved with anticoagulant therapy. Which of these statements best characterizes the underlying problem of her PE?
- A) Ventilation was occurring, but perfusion was inadequate causing shortness of breath.
  - B) The combination of normal perfusion but compromised ventilation caused hypoxia.
  - C) She developed a transient anatomic shunt resulting in impaired oxygenation.
  - D) Impaired gas diffusion across alveolar membranes resulted in dyspnea and hypoxia.

Ans: A

**Feedback:**

Impaired blood flow to a portion of the lung, such as with a PE, is associated with ventilation without perfusion, rather than perfusion without ventilation. The situation is not related to an anatomic shunt or impaired diffusion across alveolar membranes.

16. Following a winter power outage, a client who had been using a home gasoline generator began to experience dizziness and headaches and was diagnosed with carbon monoxide poisoning. What is the goal of hyperbaric oxygen treatment for carbon monoxide poisoning?

A) To increase the amount of oxygen carried in the dissolved state  
B) To increase the production of unbound hemoglobin  
C) To stimulate the release of oxygen at the capillaries  
D) To remove bound CO from hemoglobin

Ans: A

**Feedback:**

While increased alveolar  $PO_2$  improves the oxygen saturation of hemoglobin, carbon monoxide occupies the hemoglobin sites usually available for oxygen. With much of the blood composed, temporarily, of carboxyhemoglobin, it is necessary to rely upon alternate means to deliver oxygen to the tissues. Plasma's normally low carrying capacity for dissolved oxygen can be increased by administration of 100% oxygen in the high atmospheric pressure of a hyperbaric chamber.

17. Which of the following situations is most likely to result in an increased binding affinity of hemoglobin for oxygen?

A) A client is in respiratory acidosis, with a low pH.  
B) Three of four binding sites on a client's hemoglobin molecule are occupied by oxygen.  
C) A client's body temperature is elevated as a result of an infectious process.  
D) An increase in 2,3-diphosphoglycerate enhances the loading of oxygen.

Ans: B

**Feedback:**

As each binding site on a hemoglobin molecule is occupied, the affinity of the remaining sites for oxygen binding is increased. Increased affinity is associated with alkalosis, not acidosis, and fever causes reduced affinity. Exercise increases the unloading of oxygen, a situation characterized by low affinity.

18. A nurse in a respiratory unit of a hospital is providing care for a client with end-stage lung disease. Consequently, measurement of the client's arterial blood gases indicates increased  $\text{PCO}_2$ . Which of the following associated consequences would the nurse anticipate?

- A) A shift to the left of the oxygen–hemoglobin dissociation curve
- B) Lower than normal production of  $\text{HCO}_3$
- C) Higher than normal production of  $\text{H}^+$
- D) An absence of carbaminohemoglobin

Ans: C

**Feedback:**

As a result of the combination of water and carbon dioxide, hydrogen ions are produced along with bicarbonate. This would be associated with a shift to the right of the oxygen–hemoglobin dissociation curve, increased bicarbonate output, and higher than normal levels of carbaminohemoglobin.

19. Which of the following neurological patients is most likely to have abnormalities in breathing regulation?

- A) A 23-year-old male who has an injury to his frontal lobe following a sports injury
- B) A 45-year-old female with a spinal cord injury at C7 following a motor vehicle accident
- C) A 34-year-old male with damage to his upper and lower pons following a blow to the back of the head
- D) A 66-year-old male with temporal lobe infarcts secondary to a stroke

Ans: C

**Feedback:**

The respiratory center is located in the pons. Damage to the temporal lobe, frontal lobe, or spinal cord at C7 is less likely to affect respiration.

20. A nurse in an acute medical unit is providing care for a number of patients with a variety of diagnoses. Which of the following patients most likely exhibits risk factors for impaired coughing? A patient with

- A) an injury to her cerebellum.
- B) a nasogastric (NG) tube attached to suction.
- C) a diagnosis of viral pneumonia.
- D) diagnosis of diabetes mellitus and morbid obese.

Ans: B

**Feedback:**

An NG tube can inhibit the closing of the upper airways that is required for normal coughing. Pneumonia, obesity, diabetes, and injury to the cerebellum are unlikely to affect the ability to cough.

## Chapter 30- a-Respiratory Tract Infections, Neoplasms

1. As part of a public health initiative, a nurse is teaching a group of older adults about ways to promote and maintain their health. Recognizing that the common cold is a frequent source of ailment, the nurse is addressing this health problem. Which of the following teaching points about the common cold is most accurate?
  - A) "You shouldn't be taking antibiotics for a cold until your doctor has confirmed exactly which bug is causing your cold."
  - B) "It's important to both cover your mouth when you cough or sneeze and encourage others to do so, since most colds are spread by inhaling the germs."
  - C) "Scientists don't yet know exactly what virus causes the cold, and there is not likely to be a vaccine until this is known."
  - D) "Use caution when choosing over-the-counter drugs for your cold; most people do best with rest and antifever medications."

Ans: D

**Feedback:**

The efficacy of over-the-counter cold remedies is minimal, and all have a risk of unwanted side effects; rest and antipyretics are normally sufficient since cold viruses are normally self-limiting. No cold-causing virus will respond to antibiotics, and most colds are spread by the fingers. There is no one specific virus that causes the common cold, and numerous different viruses cause similar symptoms.

2. Which of the following patients who presented to a walk-in medical clinic is most likely to be diagnosed with a rhinosinusitis rather than a common cold?
  - A) A man complaining of general fatigue, a headache, and facial pain with a temperature of 100.9°F
  - B) A woman presenting with malaise, lethargy, and copious nasal secretions
  - C) A man with a dry, stuffy nasopharynx, a sore throat, and temperature of 98.9°F
  - D) A woman complaining of generalized aches and who has a hoarse voice and reddened, painful upper airways

Ans: A

**Feedback:**

Fever and facial pain are more commonly associated with rhinosinusitis rather than the common cold. The other noted symptoms are indicative of the common cold rather than rhinosinusitis.

3. A child with rhinosinusitis should be monitored for complications. Which of the following assessment findings would alert the nurse that a complication is developing?
- A) Purulent nasal discharge
  - B) Temperature of 100.8°F
  - C) Periorbital edema
  - D) Complaints of headache

Ans: C

**Feedback:**

Expected s/s of acute viral rhinosinusitis include facial pain, headache, purulent nasal discharge, decreased sense of smell, and fever. Complications can lead to intracranial and orbital wall problems. Facial swelling over the involved sinus, abnormal extraocular movements, protrusion of the eyeball, periorbital edema, or changes in mental status may indicate intracranial complications.

4. A family physician is performing patient teaching about the influenza virus with each patient who has come to the clinic to receive that year's vaccine. Which of the following statements by the patient best reflects an accurate understanding of the flu virus?
- A) "I could come down with viral or bacterial pneumonia as a result of a bad flu bug."
  - B) "I know my vaccination is especially important since there aren't any drugs that can treat the flu once I get sick with it."
  - C) "The emphasis on bundling up, staying warm, and drinking lots of fluids is outdated and actually ineffective."
  - D) "Like all vaccines, it is ideal if everyone in a population gets immunized against the flu."

Ans: A

**Feedback:**

Viral and bacterial pneumonia are known sequelae of influenza. Antiviral drugs do exist for the flu, and the efficacy of staying warm and increasing fluid consumption have been demonstrated. The flu vaccine is recommended for higher risk individuals, and guidelines do not indicate the need for all individuals to be vaccinated.

5. A pneumonia that occurs 48 hours or more after admission to the hospital is considered
- A) community-acquired pneumonia.
  - B) hospital-acquired pneumonia.
  - C) viral pneumonia.
  - D) immunocompromised pneumonia.

Ans: B

**Feedback:**

Hospital-acquired pneumonia is defined as a lower respiratory tract infection that was not present or incubating on admission to the hospital. Usually, infections occurring 48 hours or more after admission are considered hospital acquired. Community-acquired pneumonia is diagnosed within 48 hours after admission. Most hospital-acquired pneumonia is bacterial.

6. A nurse is providing care for an older, previously healthy adult male who has been diagnosed today with pneumococcal pneumonia. Which of the following signs and symptoms is the nurse most likely to encounter?
- A) The man will be hypotensive and febrile and may manifest cognitive changes.
  - B) The patient will have a cough producing clear sputum, and he will have faint breath sounds and fine crackles.
  - C) The patient will have copious bloody sputum and diffuse chest pain and may lose his cough reflex.
  - D) The patient will lack lung consolidation and will have little, if any, sputum production.

Ans: B

**Feedback:**

The typical onset of pneumococcal pneumonia involves production of clear sputum, along with faint breath sounds and fine crackles. The patient is less likely to be hypotensive, have copious bloody sputum, or have chest pain. A lack of lung consolidation or sputum production is more closely associated with atypical pneumonias.



7. A client with a newborn infant is also the caregiver for her 75-year-old mother, who lives with them and who has diabetes. The client requests pneumonia vaccinations for her entire household. Which vaccine is most likely to be effective for the baby?
- A) Since the baby's immune system is mature at birth, regular vaccine is appropriate.
  - B) There is no effective vaccine for newborn infants.
  - C) The 23-valent vaccine will be effective.
  - D) No vaccine is necessary for the baby if the nursing mother is immunized.

Ans: B

**Feedback:**

*S. pneumoniae* capsular polysaccharides would be especially appropriate for the client and her diabetic, elderly mother but is not effective in the immune system of anyone younger than 2 years old. Fortunately, a newer, 7-valent vaccine was designed to protect infants as young as 7 months. However, because their immune system is immature, the antibody response to most flu shots is poor or inconsistent in children younger than 2 years of age.

8. A 66-year-old male presents to the emergency room accompanied by his wife who claims that he has been acting confused. The man is complaining of a sudden onset of severe weakness and malaise and has a dry cough and diarrhea. His temperature is 102.8°F, and his blood work indicates his sodium level at 126 mEq/L (normal 135 to 145 mEq/L). Based on this assessment, the nurse suspects the patient has
- A) bronchopneumonia.
  - B) *Mycoplasma pneumoniae*.
  - C) *Legionella pneumoniae*.
  - D) pneumococcal pneumonia.

Ans: C

**Feedback:**

Confusion, dry cough, diarrhea, and hyponatremia are associated with Legionnaire disease and less so with bronchopneumonia, *Mycoplasma pneumoniae*, or pneumococcal pneumonia.

9. A health educator is performing a health promotion workshop with the staff of a large, urban homeless shelter, and a component of the teaching centers around tuberculosis. One of the staff members comments, "Anyone who's had contact with tuberculosis in the past can give it to any of the other residents of the shelter, even if they didn't get sick themselves." How could the educator best respond to this comment?
- A) "Many people do manage to fight off the infection, but you're right: they can still spread it by coughing or sneezing."
  - B) "If someone has been previously exposed to tuberculosis, they are particularly infectious because they are often unaware of the disease."
  - C) "Actually, people who have the latent form of the disease won't be sick and can't spread it either."
  - D) "There isn't any real risk of them spreading it, but we would like to vaccinate everyone who's had any contact with it in the past."

Ans: C

**Feedback:**

Contact with *M. tuberculosis* without the development of progressive primary tuberculosis results in a latent infection that is not communicable. Vaccination is not a common intervention in the United States.

10. When educating a student who lives in a crowded apartment and diagnosed with tuberculosis, the college school nurse will emphasize,
- A) "Once your fever goes away, you can stop taking the streptomycin injection."
  - B) "If isoniazid makes you nauseous, we can substitute something milder."
  - C) "To destroy this bacterium, you must strictly adhere to a long-term drug regimen."
  - D) "You will have to wear an N95 mask while on campus at all times."

Ans: C

**Feedback:**

Success of chemotherapy for prophylaxis and treatment of tuberculosis depends on strict adherence to a lengthy drug regimen that includes isoniazid (INH), rifampin, ethambutol, pyrazinamide, and streptomycin (or some combination of these).

11. Around 3 weeks after razing an old chicken house, a 71-year-old retired farmer has developed a fever, nausea, and vomiting. After ruling out more common health problems, his care provider eventually made a diagnosis of histoplasmosis. Which of the following processes is most likely taking place?
- A) Toxin production by *Histoplasma capsulatum* is triggering an immune response.
  - B) Antibody production against the offending fungi is delayed by the patient's age and the virulence of the organism.
  - C) Spore inhalation initiates an autoimmune response that produces the associated symptoms.
  - D) Macrophages are able to remove the offending fungi from the bloodstream but can't destroy them.

Ans: D

**Feedback:**

Disseminated histoplasmosis results from the inability of macrophages of the reticuloendothelial system to destroy the fungi. Fungi do not produce toxins, and antibody production and autoimmune responses are not involved in the pathophysiology of this fungal infection.

12. A 62-year-old female smoker is distraught at her recent diagnosis of small cell lung cancer (SCLC). How can her physician most appropriately respond to her?
- A) "I'm sure this is very hard news to hear, but be aware that with aggressive treatment, your chances of beating this are quite good."
  - B) "This is very difficult to hear, I'm sure, and we have to observe to see if it spreads because that often happens."
  - C) "I'm very sorry to have to give you this news; I'd like to talk to you about surgical options, however."
  - D) "This is a difficult diagnosis to receive, but there is a chance that the cancer may go into remission."

Ans: B

**Feedback:**

Metastases are common with SCLC. Survival rates are very low; surgical options do not exist; and remission is very unlikely.

13. A patient with small cell lung cancer (SCLC) has developed a paraneoplastic syndrome called Cushing syndrome. Based on this new complication, the nurse will likely assess which of the following clinical manifestations of Cushing syndrome?
- A) Weight gain, moon face, buffalo hump, and purple striae on the abdomen
  - B) Bilateral edema in the arms, swollen face, and protruding eyes
  - C) Severe bone/joint pain, nausea/vomiting, and polyuria
  - D) Tetany, new-onset seizure activity, emotional lability, and extrapyramidal symptoms

Ans: A

**Feedback:**

SCLS is associated with several types of paraneoplastic syndromes, including Cushing's. Answer choice B refers to superior vena cava syndrome; answer choice C refers to hypercalcemia; and answer choice D refers to tumor lysis syndrome. All of these are complications that can occur with cancer and treatment of cancer.

14. A 77-year-old lifetime smoker has been diagnosed with a tumor in his lung at the site of an old tubercle scarring site, located in a peripheral area of his bronchiolar tissue. What is this client's most likely diagnosis?
- A) Squamous cell carcinoma
  - B) Small cell lung cancer
  - C) Large cell carcinoma
  - D) Adenocarcinoma

Ans: D

**Feedback:**

Adenocarcinoma is associated with the periphery of the lungs, often at the site of scarring, and can occur in alveolar or bronchiolar tissue. Squamous cell carcinoma, small cell lung cancer, and large cell carcinoma are less commonly associated with these traits.

15. The neonatal ICU nurse is aware that type II alveolar cells produce surfactant, and they usually develop at how many weeks of gestation?
- A) 17 to 18 weeks
  - B) 19 to 20 weeks
  - C) 24 to 28 weeks
  - D) 34 to 38 weeks

Ans: C

**Feedback:**

Type II alveolar cells begin to develop at approximately 24 weeks. These cells produce surfactant, a substance capable of lowering the surface tension of the air-alveoli interface. By the 28th to 30th week, sufficient amounts of surfactant are available to prevent alveolar collapse when breathing begins.

16. Which of the following phenomena is most likely occurring during a child's alveolar stage of lung development?

- A) Terminal alveolar sacs are developing, and surfactant production is beginning.
- B) A single capillary network exists, and the lungs are capable of respiration.
- C) The conducting airways are formed, but respiration is not yet possible.
- D) Primitive alveoli are formed, and the bronchi and bronchioles become much larger.

Ans: B

**Feedback:**

During the alveolar stage of lung development from late fetal to early childhood, a single capillary network appears, and the lungs are ready to perform respiration. The development of alveolar sacs and production of surfactant are associated with the saccular period, and formation of the conducting airways occurs during the pseudoglandular period. Formation of primitive alveoli takes place during the canalicular period.

17. Which of the following situations would be most deserving of a pediatrician's attention?

- A) The mother of an infant 2 days postpartum notes that her baby has intermittent periods of hyperventilation followed by slow respirations or even brief periods of apnea.
- B) A volunteer in the nursery notes that one of the infants, aged 2 weeks, appears unable to breathe through his mouth, even when his nose is congested.
- C) A neonate is visibly flaring her nostrils on inspiration.
- D) A midwife notes that a newborn infant's chest is retracting on inspiration and that the child is grunting.

Ans: D

**Feedback:**

Retraction and grunting indicate a significant increase in the work of breathing that can be indicative of respiratory distress syndrome, a situation that would require medical intervention. Periods of hyperventilation interspersed with reduced breathing rates are common during the transition to postpartum ventilation, and infants are commonly unable to mouth breathe. Nostril flaring could be a sign of dyspnea, but it can also be a compensatory mechanism that the infant uses to increase oxygen intake; this situation would not be considered as serious as an infant who has chest retractions and grunting.

18. A premature infant on mechanical ventilation has developed bronchopulmonary dysplasia (BPD) and is showing signs and symptoms of hypoxemia, low lung compliance, and respiratory distress. Which of the following is the most likely contributor to the infant's present health problem?
- A) High-inspired oxygen concentration and injury from positive-pressure ventilation
  - B) Failure to administer corticosteroids to the infant in utero
  - C) Insufficient surfactant production and insufficient surfactant therapy
  - D) Insufficient supplemental oxygen therapy

Ans: A

**Feedback:**

Despite the administration of corticosteroids in utero to hasten alveolar maturation, premature infants suffering respiratory distress syndrome often must be treated with supplemental oxygen and mechanical ventilation. However, overly forceful positive-pressure ventilation (barotrauma) can lead to the chronic lung impairment of BPD. Surfactant therapy is a first-line defense against the development of RDS and is also used to treat cases of BPD; additional time on a ventilator is often required as well.

19. A 3-year-old boy has developed croup following a winter cold. His care provider would recognize that which of the following microorganisms and treatments is most likely to be effective?
- A) Respiratory syncytial virus treated with intubation
  - B) Parainfluenza virus treated with a mist tent and oxygen therapy
  - C) *Haemophilus influenza* treated with appropriate antibiotics
  - D) *Staphylococcus aureus* treated with bronchodilators and mist tent

Ans: B

**Feedback:**

The majority of croup cases are caused by parainfluenza viruses, and common treatment modalities are humidified air or mist tents as well as supplementary oxygen. Respiratory syncytial virus accounts for some croup diagnoses, but intubation is not normally required. *Haemophilus influenza* is responsible for epiglottitis, while *Staphylococcus aureus* is not commonly responsible for croup.

20. The nurse caring for a male child with respiratory problems is concerned he may be developing respiratory failure. Upon assessment, the nurse knows that which of the following are clinical manifestations of respiratory failure? Select all that apply.

- A) Severe accessory muscle retractions
- B) Nasal flaring
- C) Grunting on expiration
- D) Inspiratory wheezes heard
- E) Swollen glottis

Ans: A, B, C

**Feedback:**

Children with impending respiratory failure due to airway or lung disease have rapid breathing; exaggerated use of the accessory muscles; retractions, which are more pronounced in the child than in an adult because of more compliant chest; nasal flaring; and grunting during expiration. Inspiratory wheezes are usually associated with asthma. Swollen glottis can occur with strep throat.

## Chapter 30-b- Childhood Disorders

1. New parents were just told by their physician that their son is two standard deviations above the mean. The parents later asked the nurse what that means. The nurse will explain by stating,
- A) "If your child is one standard deviation from the norm that translates to mean, he will be taller than 50% of his peers."
  - B) "This is great news since it means you will have a larger baby than most."
  - C) "Being two standard deviations above the mean translates into that your child will likely be taller than 95% of children in the population."
  - D) "With the mean being average at 50%, two standard deviations means that your child will be at least 99.7% taller than his brother."

Ans: C

**Feedback:**

The standard deviation determines how far a value varies or deviates from the mean. The points one standard deviation above or below the mean should include 68% of all values and two standard deviations 95% of all values. If a child's height is within one standard deviation of the mean, he is as tall as 68% of children in the population.

2. A woman has recently determined that she is pregnant, and her clinician believes that the conception occurred around 8 weeks prior. Since the embryo is in the third stage of embryonic development, which of the following events and processes in growth and development would be expected to be taking place?
- A) Transition from a morula to a blastocyst
  - B) Ossification of the skeleton and acceleration of body length growth
  - C) Rapid eye movement and early support of respiration
  - D) Formation of upper limbs and opening of the eyes

Ans: D

**Feedback:**

Limb formation and eye opening are associated with the third stage of the embryonic stage of development. The transition from a morula to a blastocyst occurs before the second week of gestation, while ossification of the skeleton and acceleration of body length growth do not take place until the early fetal period. Rapid eye movement and early pulmonary function emerge during the 26th through 29th weeks.



3. A midwife who is providing care for a woman during her first pregnancy is assessing for intrauterine growth retardation (IUGR) during an early prenatal checkup. Which of the following questions best addresses the risks for IUGR?
- A) "What does your typical diet look like over the course of a day?"
  - B) "What is the highest level of education that you've finished?"
  - C) "Are there many people in your life that you can count on for help and support?"
  - D) "How would you describe your mood since you've been pregnant?"

Ans: A

**Feedback:**

Nutrition is a key aspect in the prevention of IUGR. Educational level, the presence or absence of support systems, and psychosocial health may all have ramifications that could affect fetal development, but they have a less direct bearing than maternal nutrition.

4. Which of the following assessment findings of a male infant 14 hours postpartum would be considered abnormal and would require further assessment and possible intervention?
- A) The baby's first stool appears to contain blood.
  - B) The child is unable to breathe through his mouth.
  - C) The baby's skin has a yellowish orange hue.
  - D) The child's suck is weak when placed at his mother's breast.

Ans: C

**Feedback:**

While not an uncommon event in early postnatal life, jaundice requires further assessment and possibly intervention. Meconium often contains blood, and young infants are exclusive nose breathers. A child's suck is frequently weak before it becomes established in the days to follow.

5. A nurse is performing a 5-minute Apgar score on a newborn female. Which of the following characteristics of the infant's current condition would not be reflected in the child's Apgar score?
- A) The baby's heart rate is 122 beats/minute.
  - B) The infant displays a startle reflex when the crib is accidentally kicked.
  - C) The child's temperature is 35.0°C (95°F) by axilla.
  - D) The infant's skin is pink in color.

Ans: C

**Feedback:**

While heart rate, color, and presence or absence of crying are all assessment criteria in the determination of an Apgar score, temperature is not a parameter that is measured.

6. The nursery has just admitted a new infant born 1 hour ago. While performing an assessment, the nurse suspects the infant may have hypoglycemia based on which of the following assessment data? Select all that apply.
- A) Heel stick glucose value of 50 mg/dL
  - B) Infant having periods of apnea requiring physical stimulation
  - C) Muscle twitching noted while lying in crib undisturbed by nurses
  - D) Hyperactive reflexes noted especially when crying
  - E) Poor suck reflex resulting in an inability to feed properly

Ans: B, C, E

**Feedback:**

In neonates, glucose levels stabilize to a value of 50 mg/dL or higher within the first 3 hours of life. Concentrations below 45 mg/dL should be considered abnormal. Signs and symptoms of neonatal hypoglycemia include cyanosis, apnea, hypothermia, hypotonia, poor feeding, lethargy, and seizures.

7. The first-time parents of an infant girl 2 days postpartum are distressed at the jaundiced appearance of her skin and are eager for both an explanation and treatment for the problem. Which of the following responses by their physician is most accurate?
- A) "Your daughter's young liver is unable to get rid of the waste products from old red blood cells."
  - B) "Because your daughter's kidneys are so small, they have a hard time getting rid of the wastes that are always accumulating in her blood."
  - C) "Nearly half of all infants have this problem, and while it is distressing to look at, it is largely harmless and will resolve in time."
  - D) "This is a sign that your baby needs more milk than she is currently getting, and increased breast-feeding will act to flush these pigments out of her system."

Ans: A

**Feedback:**

Bilirubin is formed from the breakdown of hemoglobin in red blood cells. Normally about two thirds of the unconjugated bilirubin produced by a term newborn can be effectively cleared by the liver. However, the relative immaturity of the newborn liver and the shortened life span of the fetal red blood cells may predispose the term newborn to hyperbilirubinemia. Bilirubin clearance is not the domain of the kidneys, and treatment is often necessary. Jaundice can sometimes be addressed by increasing breast-feeding, but it is not a sign in and of itself of insufficient feeding.

8. Which of the following infants most likely requires medical intervention?
- A) A 2-day-old baby boy who has caput succedaneum
  - B) An infant 4 hours postpartum who has visible coning of his head following vaginal delivery
  - C) A girl 3 days postpartum with noticeable unilateral cephalhematoma
  - D) A male infant whose vertex delivery resulted in a brachial plexus injury

Ans: D

**Feedback:**

While caput succedaneum, cephalhematoma, and head coning are all frequently able to resolve independently, a brachial plexus injury is likely to require treatment and rehabilitation.

9. A nurse who works in a neonatal intensive care unit is providing care for an infant born at 26 weeks' gestation. Which of the following assessments would lead the nurse to suspect that the infant has developed respiratory distress syndrome (RDS)?
- A) The infant's blood pressure and temperature are normal measurements as expected.
  - B) Infant is grunting and has notable intercostal retractions with respirations.
  - C) Infant has poor motor skills and limited limb range of motion.
  - D) Infant has apnea lasting 5 to 10 seconds with a decrease in heart rate, which reverses with tactile stimulation.

Ans: B

**Feedback:**

While premature birth is associated with numerous potential health problems, including variations in vital signs, impaired motor function, and neurological deficits, the most common complications of prematurity involve respiratory function.

10. While assessing a premature infant born at 25 weeks' gestation, the neonatal intensive care unit (NICU) nurse would suspect which diagnosis when the infant displays poor muscle tone, apnea, and a new onset of somnolence?
- A) Hydrocephalus
  - B) Airway obstruction
  - C) Intraventricular hemorrhage
  - D) Sepsis

Ans: C

**Feedback:**

Prematurity is a risk for IVH. Clinical manifestations are determined by the level of involvement. The most common symptoms are poor muscle tone, lethargy, apnea, decreased hematocrit, and somnolence.

11. A premature infant who is receiving care in a neonatal intensive care unit (NICU) has just been identified as having necrotizing enterocolitis (NEC). Of the following clinical manifestations, identify those most likely to contribute to the diagnosis of NEC. Select all that apply.

- A) Feeding intolerance
- B) Inability to pass stool within the first 10 days of life
- C) Hard, taut abdomen with increasing distention
- D) Blood noted in stools
- E) Hypoactive bowel sounds on right lower quadrant

Ans: A, C, D

**Feedback:**

Immature immunity, shunting of circulation away from the GI tract, and infectious processes have all been implicated in the etiology of NEC. The classic initial symptoms are usually feeding intolerance, abdominal distention, and bloody stools shortly after the first week of life.

12. The neonatologist suspects an infant has developed sepsis with multiorgan system illness. The nurse caring for this infant will note which of the assessment findings support this diagnosis. Select all that apply.

- A) Decreasing BP with increase in heart rate indicative of shock
- B) Prolonged PT and PTT and decrease in platelet count
- C) Frequent voiding of a small amount of light-colored urine
- D) Bilateral warm feet but pedal pulses hard to palpate
- E) Positive Moro reflex when loud noise made at crib side

Ans: A, B

**Feedback:**

Premature infants' health is severely impacted by early-onset infections and progressive multiorgan system illness. Infants with sepsis frequently present with respiratory failure, shock, meningitis, DIC, acute tubular necrosis, and symmetrical peripheral gangrene. Positive Moro reflex is normal for this infant.

13. The exasperated parents of a 4-month-old infant with colic have asked their health care provider what they can do to alleviate their child's persistent crying. Based on their concerns, the nurse should educate/discuss with the parents which of the following?
- A) Encouraging them to walk away from the infant when they can no longer tolerate it
  - B) Recommending them to reduce the amount of commercial formula and increase breast-feeding
  - C) Discussing the use of prescribed antiflatulent medication that will help more than changing the formula
  - D) Demonstrating how to use a soothing voice and slow rocking back and forth as a way to calm the infant

Ans: D

**Feedback:**

The lack of a single etiologic factor makes treatment of colic difficult. The incidence is similar with both breast-feeding and formula, and while antiflatulents are sometimes used, the problem is not always attributable to intestinal gas. Even though it is a common problem that does resolve with time, parents need support. Nonpharmacologic interventions include soothing voices, singing, swaddling, and slow rhythmic rocking.

14. During a prenatal education class, a participant has related a story about how her friend's infant died of sudden infant death syndrome (SIDS). What can the educator tell the group about how they can prevent SIDS when they have their babies? Select all that apply.
- A) "The best sleeping position for your baby is on his back."
  - B) "Children are at particular risk of SIDS when they have a cold or flu, so these times require extra vigilance."
  - C) "Using drugs during pregnancy has been shown to be associated with SIDS after birth, which is one more reason for mothers to avoid them."
  - D) "It's important if anyone in your home smokes to make sure they only do it outside."
  - E) "The exact cause of SIDS still isn't known, so there's little that you can do to prevent this tragic event."

Ans: A, C, D

**Feedback:**

Prone or side-lying position, intrauterine drug exposure, and postnatal exposure to cigarette smoke are all associated with SIDS. Upper respiratory infections are not noted to present a particular risk, and though the exact etiology is not known, preventative measures do exist.

15. Due to rapid neural growth, a child can begin to control the bowel and bladder sphincters by what age?

- A) 12 months
- B) 18 months
- C) 2 years
- D) 4 years

Ans: C

**Feedback:**

The cephalocaudal proximodistal principle is followed as myelination of the cortex, brain stem, and spinal cord is completed. The spinal cord is usually completely myelinated by 2 years of age. At that time, control of anal and urethral sphincters and motor skills of locomotion can be achieved.

16. What topic should health promotion initiatives emphasize if the target audience is parents of preschoolers and the goal is to minimize mortality?

- A) Handwashing as an infection control measure
- B) Injury prevention especially when the child is near water
- C) Identifying signs of child abuse and neglect
- D) The importance of good nutrition

Ans: B

**Feedback:**

Injuries are the leading cause of death in children aged 1 to 4. While handwashing does prevent many infections, these are not commonly fatal. Likewise, child abuse and poor nutrition are valid educational topics, but they do not relate as directly and frequently to childhood death as do injuries.

17. In the grocery store, a nurse overhears a teenage mother intentionally shaming and verbally reprimanding a child in public. The mother also grabbed the child's stuffed animal and tore the limbs off. From what the nurse remembers about abuse, this would be classified as a form of

- A) physical abuse.
- B) emotional abuse.
- C) sexual abuse.
- D) neglect.

Ans: B

**Feedback:**

Emotional abuse or psychological maltreatment includes methods of verbal abuse, shaming, destruction of child's personal property, harming or killing child's pet, and bullying.

18. A 10-year-old boy has a body mass index that places him in the 96th percentile for his age and gender. While educating the parents about obesity, the nurse should emphasize that his weight may predispose him to the development of
- A) scoliosis.
  - B) respiratory infections.
  - C) gastrointestinal disorders.
  - D) type 2 diabetes.

Ans: D

**Feedback:**

Adolescent obesity is associated with an increased risk of type 2 diabetes. He is less likely to face a heightened risk of scoliosis, respiratory infections, or GI disorders.

19. A 14-year-old boy has experienced a pronounced growth spurt over the last several months. While discussing this with his parents, the nurse educates what normal male growth patterns contain. Of the following, which are accurate statements to relay to the parents? Select all that apply.
- A) Most males will complete their growth spurt by age 16.
  - B) It is not usual for their son to gain up to 30 kg in weight.
  - C) With parathyroid hormone involvement, your son may be at risk for fractures.
  - D) Expect the thorax to become broader and for the pelvis to remain narrow.
  - E) Some children have stunted growth in their arms or legs.

Ans: B, D

**Feedback:**

In males, they may continue to gain height until 18 to 20 years of age and gain from 7 to 30 kg of weight. Parathyroid hormone does not have roles that relate to the adolescent growth spurt. In males, the thorax becomes broader and the pelvis remains narrow. In girls, the opposite occurs. Growth in the arms, legs, hands, feet, and neck is followed by increases in the hip and chest months later.

20. Which of the following statements made by parents of high schoolers would be a cause for the concern the child may be thinking about suicide?
- A) "My child seems to eat all the time. He tells me that all of his friends are eating a lot as well."
  - B) "My child seems to go shopping at the mall every day after school with her friends. I think they hang out at the mall."
  - C) "My child has never had problems in school until now. He is failing classes and getting in trouble."
  - D) "My child used to talk to me about anything. Now she spends most of her time in her room texting friends."

Ans: C

**Feedback:**

Risk factors for suicide in adolescents include substance abuse, personal or family history of depression, anxiety disorders, problems at school, problems communicating with parents, having a friend who committed suicide, and family ownership of a handgun.



## Chapter 31- Disorders of Ventilation and Gas Exchange

1. As a consequence of a long-standing lung disease, a client is in a chronic state of hypoxia. Which of the following phenomena would the client's care team be most justified in anticipating?

Select all that apply.

- A) Metabolic alkalosis
- B) Increased erythropoietin production
- C) Pulmonary vasodilation
- D) Hyperventilation
- E) Personality changes

Ans: B, D, E

**Feedback:**

Increased production of erythropoietin, hyperventilation, and cognitive and personality changes are all associated with hypoxemia. Acidosis, not alkalosis, and vasoconstriction rather than vasodilation are likely to occur.

2. A patient who has been on a high-protein diet comes to the emergency department with respiratory symptoms. Upon analysis of arterial blood gases (ABGs), the patient is diagnosed with hypercapnia. The nurse will note the ABG results that confirm this diagnosis include: Select all that apply.

- A) pH 7.31 (normal 7.35 to 7.45).
- B) PO<sub>2</sub> of 97%.
- C) PCO<sub>2</sub> of 58 mm Hg (normal 38 to 42).
- D) Serum HCO<sub>3</sub> of -33 mEq/L (normal 22 to 28).
- E) Serum K<sup>+</sup> (potassium) of 3.6 mmol/L (normal 3.5 to 5.0).

Ans: A, C, D

**Feedback:**

Hypercapnia affects a number of body functions, including acid-base balance and renal, neurological, and CV functions. Elevated levels of PCO<sub>2</sub> (38 to 42) produce a decrease in pH (7.35 to 7.45) and respiratory acidosis. Compensatory mechanisms result in an increase in serum HCO<sub>3</sub> (22 to 28). In this example, the PO<sub>2</sub> level is within normal range. Serum K<sup>+</sup> is not part of the ABG analysis.

3. A nurse is providing care for a patient who has been admitted with a newly diagnosed bilateral pleural effusion. Which of the following findings from the nurse's initial assessment of the patient is incongruent with the patient's diagnosis and would require further investigation?

A) The client complains of sharp pain exacerbated by deep inspiration.  
B) The client's breath sounds are diminished on auscultation.  
C) Pulse oximetry indicates that the client is hypoxemic.  
D) The client complains of dyspnea and increased work of breathing.

Ans: A

**Feedback:**

Pleural effusion is not normally associated with pain, and intense pain that is worsened by deep breathing would necessitate further investigation. Diminished breath sounds, hypoxemia, and dyspnea are common findings associated with pleural effusion.

4. A patient arrives in the ED after an automobile accident. Which of the following clinical manifestations lead the nurse to suspect a pneumothorax? Select all that apply.

A) Respiratory rate 34  
B) Asymmetrical chest movements, especially on inspiration  
C) Diminished breath sounds over the painful chest area  
D) Pulse oximetry 98%  
E) ABG pH level of 7.38

Ans: A, B, C

**Feedback:**

Manifestations of pneumothorax include increase in respiratory rate, dyspnea, asymmetrical movements of the chest wall, especially during inspiration, hyperresonant sound on percussion, and decreased or absent breath sounds over the area of pneumothorax. The pulse oximetry reading is normal. ABG pH level of 7.38 is a normal finding.

5. A short, nonsmoking 44-year-old male presents to the emergency room with left-sided chest pain and a cough. He states that the pain started abruptly and worsens with deep breathing and coughing. He denies recent injury. Assessment includes shallow respirations with a rate of 36, normal breath sounds, and no cyanosis. Which condition is most likely causing his symptoms?

A) Myocardial infarction  
B) Spontaneous pneumothorax  
C) Pleuritis related to infection  
D) Obstructive atelectasis

Ans: C

**Feedback:**

Pleuritis, which frequently accompanies infections that cause cough, is unilateral, starts abruptly, and is worsened by coughing or deep breathing. The client's shallow, rapid breathing may be due to anxiety but also is a way of maintaining adequate air intake while avoiding deep breathing, which exacerbates the pain of pleuritis. His cough may be an indication of infection, especially as he is not a smoker. The pain of myocardial infarction is not worsened by deep breathing or coughing. Spontaneous pneumothorax would be very unlikely in a short, nonsmoking middle-aged man. Tachypnea might indicate obstructive atelectasis, but normal breath sounds and lack of cyanosis argue against it.

6. A 51-year-old female client who is 2 days postoperative in a surgical unit of a hospital is at risk of developing atelectasis as a result of being largely immobile. Which of the following teaching points by her nurse is most appropriate?

A) "Being in bed increases the risk of fluid accumulating between your lungs and their lining, so it's important for you to change positions often."  
B) "You should breathe deeply and cough to help your lungs expand as much as possible while you're in bed."  
C) "Make sure that you stay hydrated and walk as soon as possible to avoid us having to insert a chest tube."  
D) "I'll proscribe bronchodilator medications that will help open up your airways and allow more oxygen in."

Ans: B

**Feedback:**

Atelectasis is characterized by incomplete lung expansion and can often be prevented by deep breathing and coughing. Pleural effusion, not atelectasis, is associated with fluid accumulation between the lungs and their lining, and neither chest tube insertion nor bronchodilators are common treatments for atelectasis.

7. Which of the following statements best captures the etiology of the acute response phase of extrinsic (atopic) asthma?
- A) IgG production is heightened as a consequence of exposure to an allergen.
  - B) Airway remodeling results in airflow limitations.
  - C) Epithelial injury and edema occur along with changes in mucociliary function.
  - D) Chemical mediators are released from presensitized mast cells.

Ans: D

**Feedback:**

The acute response phase of extrinsic asthma is characterized by the release of chemical mediators from mast cells that have been sensitized. Epithelial injury and edema, as well as airway remodeling, are not associated with the acute phase, and IgE, not IgG, is primarily involved in asthma.

8. The mother of a 7-year-old boy who has recently been diagnosed with childhood asthma has come to the education center to learn more about her son's condition. Which of the following teaching points is most justifiable?
- A) "Research has shown that viruses may actually be a factor in many children's asthma."
  - B) "The most reliable indicator that your child is having an asthma attack is audible wheezing."
  - C) "Steroids that your child can inhale will likely be the first line of defense."
  - D) "Your son will likely need to limit or avoid exercise and sports."

Ans: A

**Feedback:**

Viruses have been implicated as a contributing factor in childhood asthma. Wheezing may or may not be present in children, and inhaled corticosteroids are not common as an initial therapy. Current treatment guidelines do not advise the categorical avoidance of exercise.

9. In the early morning, an African American woman brings her 5-year-old son to the emergency room. The boy is wheezing, is short of breath, and has a dry cough. The mother states that he has always been very healthy. He went to bed with only a slight cold and a runny nose but woke her with his coughing shortly after 4 AM. His symptoms worsened so dramatically that she brought him to the hospital. The care team would most likely suspect that he has
- A) respiratory syncytial virus.
  - B) influenza.
  - C) asthma.
  - D) pneumonia.

Ans: C

**Feedback:**

Although the child may have an infectious disease, his symptoms and the timing of them (both in terms of his age and the time of symptom onset) are classic for asthma. They are not as closely associated with RSV, influenza, or pneumonia.

10. Which of the following residents of a long-term care facility is most likely to be exhibiting the signs and symptoms of chronic obstructive pulmonary disease (COPD)?
- A) A 79-year-old lifetime smoker who is complaining of shortness of breath and pain on deep inspiration
  - B) An 81-year-old smoker who has increased exercise intolerance, a fever, and increased white blood cells
  - C) An 81-year-old male who has a productive cough and recurrent respiratory infections
  - D) An 88-year-old female who experiences acute shortness of breath and airway constriction when exposed to tobacco smoke

Ans: C

**Feedback:**

Productive cough and recurrent respiratory infections are associated with COPD, while pain, fever, and increased white cells are not common signs and symptoms of COPD. Acute shortness of breath and bronchoconstriction are associated with asthma.

11. A COPD patient asks the nurse what medications are prescribed to help his breathing. The nurse, looking at the list of medications, will educate the patient about which of the following medications to help his COPD in the long term? Select all that apply.
- A) Salmeterol (Serevent), a bronchodilator
  - B) Tiotropium (Spiriva), anticholinergic
  - C) Alprazolam (Xanax), a benzodiazepine
  - D) Sildenafil (Viagra), a vasodilator
  - E) Ketorolac (Toradol), an NSAID

Ans: A, B

**Feedback:**

Pharmacologic treatment of COPD includes the use of bronchodilators (Serevent) and anticholinergic drugs (Tiotropium). Benzodiazepines are used for anxiety, and sildenafil is a vasodilator commonly prescribed not only for erectile dysfunction but also for patients with pulmonary hypertension. Toradol (ketorolac) is an NSAID for pain and inflammation.

12. A nurse is providing care for a client who has been admitted to a medical unit with a diagnosis of bronchiectasis. Which of the following signs and symptoms should the nurse expect to find during physical assessment of the client and the review of the client's history? Select all that apply.
- A) Recurrent chest infections
  - B) Production of purulent sputum
  - C) A barrel chest
  - D) Low hemoglobin levels
  - E) Recent surgery

Ans: A, B, D

**Feedback:**

Chest infections, copious production of purulent sputum, and anemia are all associated with bronchiectasis. A barrel chest is more commonly evident with emphysema, and recent surgery is not a noted factor.

13. A physician is providing care for a child who has a diagnosis of cystic fibrosis (CF). Place the following events in the etiology of CF in ascending chronological order. Use all the options.

- A) Airway obstruction
- B) Recurrent pulmonary infections
- C) Impaired  $\text{Cl}^-$  transport
- D) Decreased water content of mucociliary blanket
- E) Increased  $\text{Na}^+$  absorption

Ans: C, E, D, A, B

**Feedback:**

CF is associated with impaired  $\text{Cl}^-$  transport and a consequent increase in  $\text{Na}^+$  absorption. These result in a lowered water content of the mucociliary blanket making it more viscid. These changes to the mucociliary blanket cause airway obstruction and, ultimately, pulmonary infections.

14. Which of the following clinical findings would be most closely associated with a client who has interstitial lung disease in comparison to chronic obstructive pulmonary disease (COPD)?

- A) Audible wheezing on expiration
- B) Reduced expiratory flow rates
- C) Decreased tidal volume
- D) Normal forced expiratory volume

Ans: C

**Feedback:**

Because it takes less work to move air through the airways at an increased rate than it does to stretch a stiff lung to accommodate a larger tidal volume, interstitial lung disease is commonly associated with an increased respiratory rate but decreased tidal volume. Wheezing and decreased expiratory flow rate are more closely associated with COPD.

15. A patient is admitted for a relapse for sarcoidosis. Knowing this is usually caused by an inflammatory process, the nurse can anticipate administering

- A) a bronchodilator.
- B) a corticosteroid.
- C) aspirin.
- D) an albuterol inhaler.

Ans: B

**Feedback:**

Treatment is directed at interrupting the granulomatous inflammatory process that is characteristic of the disease and managing the associated complications. When treatment is indicated, corticosteroid drugs are used. Bronchodilators may be used if there is wheezing, but this is not a normal medication for this disease. Aspirin is a blood thinner. Albuterol is a short-term bronchodilator for acute asthma.

16. Which of the following clients are displaying known risk factors for the development of pulmonary emboli? Select all that apply. A client who is:
- A) immobilized following orthopedic surgery.
  - B) experiencing impaired  $\text{Cl}^-$  and  $\text{Na}^+$  regulation.
  - C) taking amiodarone for the treatment of premature ventricular contractions.
  - D) a smoker and who takes oral contraceptives.
  - E) undergoing radiation therapy for the treatment of breast cancer.

Ans: A, D

**Feedback:**

Postsurgical immobility, smoking, and the use of oral contraceptives are all identified risk factors for the development of pulmonary emboli. Impaired  $\text{Cl}^-$  and  $\text{Na}^+$  regulation are associated with cystic fibrosis, while amiodarone and radiation therapy are linked to interstitial lung diseases.

17. A patient with pulmonary hypertension may display which of the following clinical manifestations? Select all that apply.
- A) Shortness of breath
  - B) Decreased exercise tolerance
  - C) Nasal flaring
  - D) Grunting on expiration
  - E) Swelling (edema) of the legs and feet

Ans: A, B, E

**Feedback:**

Symptoms of PAH typically progress from shortness of breath and decreasing exercise tolerance to right heart failure, with marked peripheral edema and functional limitations. Other common symptoms include fatigue, angina, and syncope (fainting) or near-syncope. Nasal flaring and expiratory grunting are usually seen in infants experiencing respiratory distress.

18. Upon admission to the ICU, a patient with a history of cor pulmonale will likely be exhibiting which of the following clinical manifestations of right heart failure? Select all that apply.
- A) Fine crackles throughout both lung fields
  - B) +4 pitting edema in lower extremities
  - C) Expecterating copious amounts of frothy, pink sputum
  - D) Jugular vein distension
  - E) Altered level of consciousness

Ans: B, D, E

**Feedback:**

Signs of right-sided HF include venous congestion (jugular vein distension), peripheral edema (+4 pitting edema in feet), shortness of breath, and productive cough. Altered level of consciousness may occur as the result of carbon dioxide retention. Fine crackles in all lung fields and frothy, pink sputum are common in left-sided HF.



19. A 41-year-old male client has presented to the emergency department with an acute onset of increased respiratory rate and difficulty breathing. STAT chest x-ray indicates diffuse bilateral infiltrates of his lung tissue, and ECG displays no cardiac dysfunction. What is this client's most likely diagnosis?

A) Cor pulmonale  
B) Acute lung injury  
C) Pulmonary hypertension  
D) Sarcoidosis

Ans: B

**Feedback:**

Rapid onset of respiratory distress accompanied by diffuse bilateral infiltrates of lung tissue and an absence of cardiac changes are associated with acute lung injury/acute respiratory distress syndrome. These particular signs and symptoms are not as closely associated with cor pulmonale, pulmonary hypertension, or sarcoidosis.

20. While rock climbing, a 22-year-old male has endured a severe head injury. Which of the following statements best captures expected clinical manifestations and treatments for his immediate condition?

A) Oxygen therapy is likely to decrease his respiratory drive and produce an increase in  $PCO_2$ .  
B) Cheyne-Stokes breathing is likely but will respond to bronchodilators.  
C) The client is unlikely to respond to supplementary oxygen therapy due to impaired diffusion.  
D) Hypoventilation may exist, resulting in increased  $PCO_2$  and hypoxemia that may require mechanical ventilation.

Ans: D

**Feedback:**

Brain injuries and accompanying hypoventilation are often associated with increased  $PCO_2$  and by hypoxemia that responds to oxygen therapy. Persons with COPD are more vulnerable to diminished respiratory drive secondary to oxygen therapy, while Cheyne-Stokes breathing is not identified as a likely consequence of brain injury. Impaired alveolar diffusion is not an aspect of the client's injury.

## Chapter 32- Structure and Function of the Kidney

1. A dialysis technician is providing care for a client with chronic renal failure. The technician would recognize which of the following characteristics of healthy kidneys? Select all that apply.

- A) The kidneys are contained within the peritoneal cavity.
- B) Blood vessels, nerves, and ureters all connect with the kidney at the hilus.
- C) The medulla of the kidney contains the glomeruli.
- D) Each kidney consists of lobes, with each lobe comprised of nephrons.
- E) Each nephron contains several hundred glomeruli that perform filtration.

Ans: B, D

**Feedback:**

The hilus is the point of nerve and blood input and urine output for each kidney, and each kidney is composed of up to 18 lobes. The kidneys are outside the peritoneal cavity, and glomeruli exist in the outer cortex. Each nephron contains just one glomerulus.

2. A patient in the ICU has been diagnosed with hypovolemic shock. His BP is 88/53, heart rate 122, and respiratory rate 26. Given these vital signs, the nurse should expect the urine output to be

- A) maintained between 30 and 50 mL/hour with no sediment in the bag.
- B) increased to 60+ mL/hour with dilute urine.
- C) decreased below 30 mL/hour with decreased GFR.
- D) the patient's normal amount with dark, concentrated urine.

Ans: C

**Feedback:**

Under conditions of decreased perfusion or increased sympathetic nervous system stimulation, blood flow is redistributed away from the cortex toward the medulla. This redistribution of blood flow decreased glomerular filtration while maintaining the urine-concentrating ability of the kidneys, a factor that is important during conditions such as shock. The urine output would not increase, nor be normal.

3. At which of the following locations in the nephron would a health care professional first expect blood to be largely free of plasma proteins?

- A) Proximal convoluted tubule
- B) Bowman space
- C) Loop of Henle
- D) Afferent arteriole

Ans: B

**Feedback:**

Active filtration occurs when the whole blood enters via the afferent arteriole in to the glomerular capillaries, and the blood is then filtered into the Bowman space, removing plasma proteins. The filtrate that enters the proximal convoluted tubule and the loop of Henle is already free of plasma proteins.

4. Which of the following statements about mesangial cells within the glomerulus is accurate? Select all that apply. Mesangial cells
- A) cover the entire amount of endothelial cells contained within the capillaries.
  - B) have phagocytic properties that remove macromolecular materials.
  - C) exhibit vasodilator properties to assist with increase in blood flow in times of stress.
  - D) enlarge (hyperplasia) in response to glomerular diseases.
  - E) are coiled and drain Bowman capsule.

Ans: B, D

**Feedback:**

Mesangial cells possess phagocytic properties and remove macromolecular materials that enter the intercapillary spaces. Mesangial cells also exhibit contractile properties in response to neurohumoral substances and are thought to contribute to the regulation of blood flow through the glomerulus. Mesangial hyperplasia and increased mesangial matrix occur in a number of glomerular diseases. The nephron tubule, called the proximal convoluted tubule, is coiled and drains the Bowman capsule

5. A nurse educator is orientating new nurses to a renal unit of the hospital. Which of the following teaching points should the nurse include as part of a review of normal glomerular function?
- A) "Nephrons are delicate structures that cannot endure the high pressure that exists in capillary beds elsewhere in the body."
  - B) "Glomerular filtrate is very similar in composition to blood plasma found elsewhere in circulation."
  - C) "Dilation of the afferent arteriole allows more blood into the nephron and increases the glomerular filtration rate."
  - D) "The glomerulus is located between an arteriole and a venule that work together to regulate blood flow."

Ans: B

**Feedback:**

Because filtration achieves the removal of nearly all blood proteins, the glomerular filtrate is nearly identical to plasma. Nephrons require high pressure to function, and dilation decreases the glomerular filtration rate. The glomerulus is located between two arterioles.

6. While assessing a patient with urosepsis, the ICU nurse notes the patient's BP is 80/54; HR 132; RR 24; and pulse oximetry 89% on 6 lpm O<sub>2</sub>. Over the last hour, the patient's urine output is 15 mL. When explaining to a new graduate nurse, the nurse will emphasize that the patient's status may relate to that
- A) the infection is deep inside the kidney, and it will take a long time for the antibiotics to kill the bacteria.
  - B) the patient's sympathetic nervous system has been stimulated that has resulted in vasoconstriction of the afferent arteriole, which causes a decrease in renal blood flow.
  - C) the glomerular filtration system gets overwhelmed in times of stress (like infections) and can become clogged with waste material from the bacteria.
  - D) the ability to transport substances from the tubular fluid into the peritubular capillaries becomes impaired, which results in fluid being forced out of capillaries into the glomerulus.

Ans: B

**Feedback:**

During periods of strong sympathetic stimulation, such as shock, constriction of the afferent arteriole causes a marked decrease in renal blood flow and thus glomerular filtration pressure. Consequently, urine output can fall almost to zero.

7. Which of the following substances is most likely to be reabsorbed in the tubular segments of the nephron using passive transport mechanisms?
- A) Water
  - B) Sodium
  - C) Phosphate
  - D) Calcium

Ans: A

**Feedback:**

Water is passively reabsorbed across tubular epithelial membranes, while ions like sodium, phosphate, and calcium necessitate active transport.

8. When explaining to a class of nursing students enrolled in pathophysiology, the instructor states, "the majority of energy used by the kidney is for
- A) filtration of drugs out of the body."
  - B) secretion of erythropoietin for production of RBCs."
  - C) active sodium transport mechanisms."
  - D) removal of excess glucose from the blood."

Ans: C

**Feedback:**

The bulk of energy used by the kidney is for active sodium transport mechanisms that facilitate sodium reabsorption and cotransport of other electrolytes and substances such as glucose and amino acids.

9. Damage to which of the following areas of a nephron would most likely result in impaired secretion and reabsorption?

- A) Distal tubule
- B) Loop of Henle
- C) Proximal tubule
- D) Collecting tubule

Ans: C

**Feedback:**

Approximately two thirds of the absorption and secretion that occur in the tubular system take place in the proximal tubule.

10. When explaining the role of the proximal tubule in terms of medication administration, the nursing instructor will emphasize that which of the following medications are bound to plasma proteins and require the proximal tubule secretion of exogenous organic compounds to help with filtration? Select all that apply.

- A) Penicillin
- B) Aspirin
- C) Morphine sulfate
- D) Potassium chloride
- E) Sodium chloride

Ans: A, B, C

**Feedback:**

The proximal tubule secretes exogenous organic compounds such as penicillin, aspirin, and morphine. Many of these compounds can be bound to plasma proteins and are not freely filtered in the glomerulus. Therefore, excretion by filtration alone eliminates only a small portion of these potentially toxic substances from the body.

11. Which of the following statements most accurately captures the function of the ascending loop of Henle?

- A) Urine is concentrated by the selective absorption of free water in the ascending limb.
- B) Sodium and water are reabsorbed in equal amounts, reducing filtrate quantity but maintaining osmolality.
- C) The majority of solute and water reabsorption occurs in the ascending loop of Henle.
- D) Impermeability to water and absorption of solutes yields a highly dilute filtrate.

Ans: D

**Feedback:**

The osmolality of the filtrate reaches a low of 100 mOsm/kg of water in the ascending limb as a result of its impermeability to water.

12. To treat enuresis in a young girl, her pediatrician prescribes desmopressin, an antidiuretic hormone (ADH) nasal spray, before bedtime. What is the most likely rationale for this treatment?
- A) It removes water from the filtrate and returns it to the vascular compartment.
  - B) It lessens the amount of fluid entering the glomerulus.
  - C) It leads to the production of dilute urine.
  - D) It causes tubular cells to lose their water permeability.

Ans: A

**Feedback:**

ADH maintains extracellular volume by returning water to the vascular compartment. This leads to the production of concentrated urine by removing water from the tubular filtrate. In exerting its effect, ADH produces a marked increase in water permeability in tubular cells.

13. Following an automobile accident where the patient had a traumatic amputation of his lower leg and lost greater than 40% of his blood volume, he is currently not producing any urine output. The nurse bases this phenomena on which of the following humoral substances responsible for causing severe vasoconstriction of the renal vessels?
- A) Aquaprin-2 channels
  - B) Angiotensin II and ADH
  - C) Renin and potassium ions
  - D) Albumin and norepinephrine

Ans: B

**Feedback:**

Increased sympathetic activity causes constriction of the afferent and efferent arterioles and thus a marked decrease in renal blood flow. Intense sympathetic stimulation can produce marked decreases in renal blood flow and GFR. Humoral substances, including angiotensin II, ADH, and endothelins, produce vasoconstriction of renal blood flow. Aquaporin-2 channels, potassium ions, and albumin do not have vasoconstriction properties.

14. A physician who is providing care for a 71-year-old male client with a recent diagnosis of renal failure and an acid–base imbalance is explaining some of the underlying etiology of the man's diagnoses to him and his family. Which of the following phenomena would most accurately underlie the teaching that the physician provides?
- A) The kidneys are integral to the reabsorption of hydrogen ions and maintenance of a low pH.
  - B) Blood buffer systems and respiratory control can compensate for inadequate renal control of pH.
  - C) The kidneys have the primary responsibility for eliminating excess hydrogen ions from the body.
  - D) pH is kept at an optimal level through the renal secretion of bicarbonate ions in blood filtrate.

Ans: C

**Feedback:**

The kidneys have the primary responsibility for maintaining body pH by eliminating excess hydrogen ions from the body, a function that blood buffer systems and respiratory control are incapable of. Hydrogen ions must be eliminated, not retained, and bicarbonate must be produced as part of buffer action, not secreted.

15. Which of the following clients on a medical unit of a hospital is most likely to be experiencing health problems that may be attributable to kidney disease?
- A) An 81-year-old female client with osteoporosis and anemia
  - B) A 77-year-old client with urinary retention due to benign prostatic hyperplasia (BPH)
  - C) A 55-year-old woman with a recent stroke secondary to long-standing hypertension
  - D) A 60-year-old man with a systemic fungal infection requiring intravenous antibiotics.

Ans: A

**Feedback:**

The kidneys play central roles in both vitamin D activation and regulation of red blood cell production, deficiencies of which may result in osteoporosis and anemia, respectively. BPH, stroke, and infection are less likely to result from kidney disease.

16. While living and hiking in the Rocky Mountains, a gentleman slipped and fell. He goes to an urgent care where an x-ray was done, and some blood was drawn for a CBC. The clinic informs him that he is anemic. What may contribute to this person's anemia? Select all that apply.

- A) Living in a high altitude
- B) Tissue hypoxia
- C) Inability to manufacture erythropoietin
- D) Destruction of RBCs caused by natural killer cells
- E) Dehydration

Ans: A, B, C

**Feedback:**

The synthesis of erythropoietin is stimulated by tissue hypoxia, which may be brought about by anemia, residing at high altitudes, or impaired oxygenation of tissues due to cardiac or pulmonary disease. Dehydration will cause an elevated level of RBCs.

17. Which of the following patients on a geriatric medical unit is most likely to require slow-release potassium supplements on a regular basis?

- A) A 90-year-old female who is taking an aldosterone antagonist to treat pulmonary edema
- B) An 81-year-old male who takes a thiazide diuretic to control his hypertension
- C) A 79-year-old male with heart failure who is receiving a loop diuretic
- D) An 83-year-old female who is taking an osmotic diuretic to address severe peripheral edema

Ans: B

**Feedback:**

A common side effect of thiazide diuretics is increased potassium losses in the urine, which may necessitate potassium supplementation. Aldosterone antagonists, loop diuretics, and osmotic diuretics are less likely to induce hypokalemia.

18. A 62-year-old woman with high blood pressure is to begin long-term treatment with a thiazide diuretic that she thinks she will need to take for some time. What should the nurse expect to happen to her potassium and calcium levels?

- A) Her potassium and calcium levels will not change.
- B) Her potassium and calcium levels will both go down.
- C) Her potassium level will drop, but her calcium level may rise.
- D) Her potassium level will rise, but her calcium level may drop.

Ans: C

**Feedback:**

Thiazide diuretics increase the loss of potassium in urine. Because calcium is actively reabsorbed in the distal convoluted tubule, it is likely that her calcium level will go up, especially if she takes it for a long time.



19. A patient in a hospital is frustrated at the inconvenience of having to collect his urine for an entire day and night as part of an ordered 24-hour urine collection test. He asks the nurse why the test is necessary since he provided a single urine sample 2 days ago. How could the nurse best respond to the patient's question?

- A) "A single urine sample lets your care team determine if there are bacteria in your urine, but other tests of urine chemistry need a longer-term view."
- B) "Current lab tests aren't able to detect the small quantities of most substances contained in a single urine sample."
- C) "Only a longer-term test is able to show whether your kidneys are letting sugar spill out into your urine."
- D) "Often why an abnormal substance shows up in urine test, a 24-hour urine collection is needed to determine exactly how much it is present in your urine."

Ans: D

**Feedback:**

Twenty-four-hour urine tests are often used to quantify the amount of substances, such as proteins, that an individual's kidneys are spilling. Single urine samples are able to assess more parameters than just the presence of bacteria, and they are sufficient in quantity to detect numerous substances such as glucose.

20. Which of the following lab results would be associated with abnormalities in kidney function? Select all that apply.

- A) An absence of protein in a urine sample
- B) Increased creatinine levels
- C) Urine gravity of 1.038 and normal serum creatinine levels
- D) Decreased blood urea nitrogen (BUN) level
- E) Detectable levels of glucose in a urine sample
- F) Elevated cystatin-C level.

Ans: B, E, F

**Feedback:**

Increased creatinine and BUN are associated with abnormalities in renal function, as is the presence of glucose in a urine sample. Urine samples normally lack protein and have a specific gravity of 1.038 to 1.040. An elevated BUN coupled with normal creatinine is likely not attributable to impaired kidney function.

## Chapter 33- Disorders of Renal Function

1. A pediatric unit will be receiving an 8-day-old infant with a suspected congenital renal disorder. Which of the following renal abnormalities could be the possible cause? Select all that apply.
- A) One of the infant's kidneys may have failed to develop normally.
  - B) The kidneys may be misshapen and have cysts present.
  - C) The upper or lower poles of the two kidneys may be fused.
  - D) Renal cell carcinoma may be present.
  - E) Urine-filled dilation of renal pelvis associated with atrophy of the kidney may be present.

Ans: A, B, C

**Feedback:**

Renal hypoplasia, cystic dysplasia, and horseshoe kidney are more common diagnoses in infants. Renal cell carcinoma is not a congenital condition or one that often manifests in infancy. Urine-filled dilation of renal pelvis associated with atrophy of the kidney is a description of hydronephrosis.

2. A 22-year-old female with a history of intermittent flank pain, repeated UTIs, and hematuria has been diagnosed with autosomal dominant polycystic kidney disease (ADPKD). Which of the following phenomena has most likely contributed to the development of this diagnosis?
- A) UTIs coupled with an impaired immune response have caused her ADPKD.
  - B) She has inherited a tendency for epithelial cells in her tubules to proliferate inappropriately.
  - C) Severe hypertension and portal hypertension are likely precursors.
  - D) She has inherited undersized kidneys that are prone to calculi formation.

Ans: B

**Feedback:**

ADPKD is an inherited condition, and the etiology is thought to involve cysts arising in segments of the renal tubules from a few epithelial cells that proliferate abnormally. UTIs are consequent, not causative, of the condition. Severe hypertension and portal hypertension are more commonly associated with ARPKD than ADPKD. Kidneys are typically oversized in ADPKD, and renal calculi are not noted sequelae.

3. One of the most reliable predictors for worsening autosomal dominant polycystic kidney disease is
- A) serum creatinine levels.
  - B) blood urea nitrogen (BUN) level.
  - C) urine albumin excretion (UAE).
  - D) urine specific gravity.

Ans: C

**Feedback:**

Serum creatinine levels have not been found to be an effective predictor marker for worsening ADPKD, but urine albumin excretion (UAE) has been determined a reliable predictor, as have increased electrolytes and hematuria.

4. A nurse has noted the high incidence of urinary tract obstructions of a variety of etiologies. Which of the following individuals are at risk of developing urinary obstructions? Select all that apply.
- A) A 43-year-old male with an acid–base imbalance secondary to malnutrition
  - B) A 29-year-old female, pregnant for the first time
  - C) A 69-year-old female with anemia secondary to insufficient erythropoietin production
  - D) A 70-year-old male with benign prostatic hyperplasia (BPH)
  - E) A 58-year-old male with renal calculi
  - F) A 28-year-old male with a neurogenic bladder secondary to spinal cord injury

Ans: B, D, E, F

**Feedback:**

Pregnancy, BPH, renal calculi, and neurogenic bladder are all identified contributors to urinary obstructions. Acid–base imbalances and impaired erythropoietin production are health problems with renal involvement but are less likely to contribute to urinary obstruction.

5. A 73-year-old man presents to his family physician with complaints of recent urinary hesitation and is eventually diagnosed with benign prostatic hyperplasia (BPH). Which of the following clinical consequences would his care provider expect prior to the resolution of his health problem?
- A) Hydroureter and pain
  - B) Development of renal calculi and renal cysts
  - C) Unilateral hydronephrosis and pain
  - D) Development of glomerulonephritis or nephrotic syndrome

Ans: A

**Feedback:**

Pain and the distention of the distal ureter would be expected manifestations of BPH. Renal calculi, cysts, glomerulonephritis, and nephrotic syndrome are unlikely to develop consequentially, and unilateral hydronephrosis is unlikely, given that the obstruction is below the level of the ureterovesical junction.

6. A 60-year-old man has been diagnosed with renal calculi after repeated episodes of excruciating flank pain in recent weeks. The man states that, "I don't know how this could happen to me, since I'm so careful about eating a healthy diet." What is the most appropriate response to the man's statement?
- A) "Your diet may have played a part in this, but in fact, genetics are likely primarily to blame."
  - B) "What you eat can influence your risk of stone formation, but many other factors like hormones and your metabolism are involved."
  - C) "You likely don't need to change your diet, but now that you have stones in one kidney, you're at very high risk of growing them in the other kidney."
  - D) "Your diet might be normally healthy, but high intake of normally beneficial minerals like calcium and magnesium can lead to stones."

Ans: B

**Feedback:**

Renal calculi have a complex etiology that includes diet, but also many other metabolic and endocrine factors, among others. Genetics are not identified as a contributor, and mineral intake is not likely to be the sole factor. Stone formation is normally unilateral.

7. Which of the following pain descriptions would lead the nurse to suspect the client is experiencing ureteral colic?
- A) Right upper quadrant pain that worsens with deep breaths and palpation
  - B) Excruciating pain in the flank and upper outer quadrant of the abdomen that radiates to the bladder area
  - C) Pain described as "fire poking in their side," pulsating with every heart beat but decreases when in fetal position
  - D) Perineal pain that increases when urinating and then lessens until the time to urinate again

Ans: B

**Feedback:**

Classic ureteral colic is manifested by acute, intermittent, and excruciating pain in the flank and upper outer quadrant of the abdomen on the affected side. The pain may radiate to the lower abdominal quadrant, bladder area, perineum, or scrotum in the man.

8. A client has been diagnosed with having calcium oxalate kidney stones following intravenous pyelography. Which of the following teaching points about the treatment of the health problem are justifiable? Select all that apply.
- A) "You may need to cut out cocoa, chocolate, and some nuts from your diet."
  - B) "It's important that you avoid high-calcium foods like milk, cheese, and yogurt."
  - C) "We will come up with a plan to safely limit your fluid intake over the next few weeks."
  - D) "Extracorporeal shock-wave lithotripsy treatment may be used to fragment larger stones."
  - E) "Most likely your stones can be dissolved by medications over the next several days."

Ans: A, D

**Feedback:**

Individuals with calcium oxalate stones often need to avoid high-oxalate foods like nuts, cocoa, and chocolate. Extracorporeal shock-wave lithotripsy treatment may be used to fragment larger renal calculi. It would not be necessary to avoid calcium intake, and fluid intake should be encouraged, not curbed. Medications can reduce the potential for stone formation but are not a common treatment modality.

9. Which of the following individuals is at the highest risk of developing a urinary tract infection (UTI)?
- A) A 60-year-old man with a history of cardiovascular disease who is recovering in hospital from a coronary artery bypass graft
  - B) A 66-year-old man undergoing dialysis for the treatment of chronic renal failure secondary to hypertension
  - C) A 38-year-old man with high urine output due to antidiuretic hormone insufficiency
  - D) A 30-year-old woman with poorly controlled diabetes mellitus

Ans: D

**Feedback:**

Young women as well as persons with diabetes are at high risk of UTIs. Neither postsurgical recovery nor renal failure is necessarily a direct risk for UTI development, and high urine output would prevent decrease rather than increase in UTI risk.

10. A 24-year-old college student has presented to the campus medical clinic with complaints of frequent, burning urination and has, subsequent to urinalysis, been diagnosed with an acute lower urinary tract infection (UTI) caused by *E. coli*. What teaching will the clinician most likely provide to the student?
- A) "This should likely resolve itself if you drink a lot of water and especially cranberry or blueberry juice."
  - B) "Unfortunately, the bacteria causing your infection is no longer responsive to antibiotics, but there are alternative treatments that we can use."
  - C) "Many of these bacteria are now resistant to some antibiotics, but I will take that into account when I choose which antibiotic to prescribe."
  - D) "This likely shows that you have some sort of obstruction in your urinary system, so when that is treated your UTI will likely resolve as well."

Ans: C

**Feedback:**

Microbial resistance to TMP-SMX antibiotics is now common in the United States; however, other specific antibiotic options do exist. Cranberry and blueberry juice are more appropriate as preventative rather than curative measures (reduces bacterial adherence to the epithelial lining of the urinary tract), and the majority of uncomplicated UTIs in young women are not the result of urinary obstructions.

11. Because the associated nephropathy is an important cause of end-stage renal failure in children and adolescents, a toddler who has had an uncomplicated bout of urinary tract infection (UTI) should still be evaluated for
- A) urethrovesical reflux.
  - B) vesicoureteral reflux.
  - C) neurogenic bladder.
  - D) detrusor muscle instability.

Ans: B

**Feedback:**

Urethrovesical reflux occurs when urine from the urethra moves into the bladder. Vesicoureteral reflux occurs when urine moves from the bladder into the ureter. Vesicoureteral reflux is the most commonly associated abnormality in UTIs. Reflux nephropathy is an important cause of end-stage renal disease in children and adolescents; children with a relatively uncomplicated first UTI may turn out to have significant reflux. Therefore, even a single documented UTI in a child requires careful diagnosis. Functional obstructions include neurogenic bladder, infrequent voiding, detrusor (bladder) muscle instability, and constipation.

12. A female client with suspected glomerular disease has been referred to a nephrologist. The nurse knows that which of the following clinical manifestations may be present with the diagnosis of acute nephritic syndrome? Select all that apply.

- A) Sudden onset of hematuria
- B) Proteinuria
- C) Flank pain
- D) Excess urine output
- E) Edema

Ans: A, B, E

**Feedback:**

In its most dramatic form, the acute nephritic syndrome is characterized by sudden onset of hematuria, variable degrees of proteinuria, diminished GFR, oliguria, and signs of impaired renal function. Inflammatory processes damage the capillary wall. This damage to the capillary wall allows RBCs to escape into the urine and produce a decrease in GFR. Extracellular fluid accumulation, hypertension, and edema develop because of the decreased GFR. Flank pain is usually associated with kidney stones. Oliguria occurs rather than excess urine output.

13. A patient has just been diagnosed with acute glomerulonephritis. Which question should the nurse ask this client in attempting to establish a cause?

- A) "Do you have a history of heart failure?"
- B) "Have you recently had kidney stones?"
- C) "Have you ever been diagnosed with diabetes?"
- D) "Have you had any type of infection within the last 2 weeks?"

Ans: D

**Feedback:**

Acute postinfectious glomerulonephritis usually occurs after infection with certain strains of group A  $\beta$ -hemolytic streptococci and is caused by deposition of immune complexes of antibody and bacterial antigens. Other organisms can also cause this infection.

14. A 9-year-old boy has been diagnosed with the nephrotic syndrome. Place the following stages in the development of his health problem in ascending order. Use all the options.
- A) Hypoalbuminemia
  - B) Increased glomerular membrane permeability
  - C) Decreased colloidal osmotic pressure
  - D) Proteins escape from the plasma to the glomerular filtrate
  - E) Accumulation of fluid in the interstitial tissue (edema)

Ans: B, D, A, C, E

**Feedback:**

The pathophysiology of the nephrotic syndrome involves damaged glomeruli becoming increasingly permeable to protein, allowing more protein into the glomerular filtrate. Massive proteinuria results, leading to hypoalbuminemia. Generalized edema, which is the hallmark of nephrotic syndrome, results from the loss of colloidal osmotic pressure of the blood with subsequent accumulation of fluid in the interstitial tissues.

15. A 25-year-old Asian American man arrives in the emergency room in a panic. Except for a bout with bronchitis a week earlier, he has been healthy his entire life; today he has blood in his urine. What disease has likely caused of his hematuria and how should it be treated?
- A) Goodpasture syndrome and will be treated with plasmapheresis and immunosuppressive therapy
  - B) Membranous glomerulonephritis and should be treated with corticosteroids
  - C) Immunoglobulin A nephropathy and may be advised to use omega-3 fatty acids to delay progression of disease
  - D) Kimmelstiel-Wilson syndrome and should be treated with medication to control high blood pressure

Ans: C

**Feedback:**

Immunoglobulin A (IgA) nephropathy (Buerger disease) is a primary glomerulonephritis characterized by the presence of glomerular IgA immune complex deposits. It can occur at any age, but most commonly occurs with clinical onset in the second and third decades of life. It is more common in males than in females and is the most common cause of glomerular nephritis in Asians. There is no satisfactory treatment for IgA nephropathy. Goodpasture syndrome is a form of glomerulonephritis; treatment includes plasmapheresis to remove circulating anti-GBM antibodies and immunosuppressive therapy to inhibit antibody production. Membranous glomerulonephritis is the most common cause of primary nephrosis in adults, most commonly those in their sixth or seventh decade. It is treated with corticosteroids. In nodular glomerulosclerosis, also known as Kimmelstiel-Wilson syndrome, there is nodular deposition of hyaline in the mesangial portion of the glomerulus. As the sclerotic process progresses in the diffuse and nodular forms of glomerulosclerosis in many cases, early changes in glomerular function can be reversed by careful control of blood glucose levels. Control of high blood pressure and smoking cessation are recommended as primary and secondary prevention strategies in persons with diabetes.



16. A 4-year-old boy who has been deaf since birth and has bilateral cataracts has been brought to the emergency department by his mother because she noticed blood in the toilet after he last voided. Urinalysis confirms heavy microscopic hematuria as well as proteinuria. What will the health care team's initial differential diagnosis most likely be?
- A) Alport syndrome
  - B) Systemic lupus erythematosus glomerulonephritis
  - C) Henoch-Schönlein purpura nephritis
  - D) Immunoglobulin A nephropathy

Ans: A

**Feedback:**

Heavy microscopic hematuria, proteinuria, and sensorineural deafness and eye disorders are characteristic of Alport syndrome. This symptomatology is less characteristic of systemic lupus erythematosus glomerulonephritis, Henoch-Schönlein purpura nephritis, or immunoglobulin A nephropathy.

17. A nurse in an acute medical unit of a hospital has admitted a 62-year-old female from the emergency department who has been diagnosed with acute pyelonephritis. Which of the following statements most accurately conveys an aspect of the knowledge base that the nurse needs to perform adequate care and teaching?
- A) Most cases of acute pyelonephritis are attributable to poorly controlled hypertension.
  - B) Flank pain, dysuria, and nausea and vomiting are likely assessment findings.
  - C) The infection in the kidney is most likely a manifestation of a systemic infection.
  - D) Imaging tests are likely to reveal scarring and deformation of the renal calices and pelvis.

Ans: B

**Feedback:**

Manifestations of acute pyelonephritis include pain, frequency, urgency, dysuria, nausea, and vomiting. Chronic rather than acute pyelonephritis is often caused by hypertension, while most cases are caused by ascending bacteria, not systemic infections. Scarring is more commonly a result of chronic pyelonephritis.

18. A 34-year-old man has been taking up to 2400 mg of ibuprofen per day following a motor vehicle accident several months ago and consequent chronic pain. He has recently been diagnosed with chronic analgesic nephritis as a result of his high analgesic intake. The man is surprised at the diagnosis stating, "I thought that taking too many drugs hurts your liver if anything, not your kidneys." What is the most appropriate response to the man's statement?
- A) "Your liver does perform most of the detoxification in your body, but your kidneys can perform this role if the liver is unable to."
  - B) "High drug intake can cause your kidneys to be very vulnerable to infections, which is likely what happened in your case."
  - C) "Your kidneys are vulnerable to damage because of how much blood flows through them and the fact that they break down many drugs."
  - D) "It is very rare for someone as young as yourself to have kidney damage like this; usually only older people are vulnerable to kidney damage from drugs."

Ans: C

**Feedback:**

High flow and pressure combined with the metabolic transformative of drugs make the kidneys vulnerable to drug toxicity. They do not play a backup role to the liver in the metabolism of drugs, and while structural and functional damage may occur with drug overuse, infection is a less likely consequence. The elderly are particularly vulnerable to drug-related nephritis and nephropathies, but it would be incorrect to conclude that younger people are thus immune.

19. A frantic mother brings her young child into the emergency department. She states that during the evening bath, she noticed a large mass in her child's abdomen. After diagnostic testing, the pediatrician tells the parents that their child has Wilms tumor, stage IV. After the doctor leaves the room, the parents ask the nurse, "What does this mean?" The nurse will respond, "Your child (s)
- A) "has cancer in his stomach."
  - B) "has cancer in the kidney that has spread most likely to his lungs."
  - C) "will need to undergo surgery to remove both kidneys and then go on dialysis."
  - D) "tumor can be easily treated with chemotherapy. We will start this soon."

Ans: B

**Feedback:**

Wilms tumor usually is a solitary mass that occurs in any part of the kidney. It usually is sharply demarcated and variably encapsulated. Stage IV means the tumors have undergone hematogenous metastasis, most commonly involving the lung. Treatment involves surgery, chemotherapy, and sometimes radiation therapy. Long-term survival rates are good (90%) for stages I to III.

20. During a family picnic, a relative of a nurse asks what he should do if there is blood in his urine and some pain in his lower abdomen. The best advice the nurse could give this family member would be for him to
- A) go to the emergency room right away.
  - B) get an appointment with his family doctor.
  - C) wait and see if it goes away without treatment.
  - D) increase his intake of cranberry juice and other fluids.

Ans: B

**Feedback:**

There are many causes of blood in the urine (infection, kidney stones, cancer, etc.). Kidney cancer can be a silent disorder with symptoms occurring late into the disease process. Any blood in the urine should be referred to the physician for further testing (ultrasound, CT scan, MRI, etc.).

## Chapter 34- Acute Renal Injury and Chronic Kidney Disease

1. Which of the following data would a clinician consider as most indicative of acute renal failure?
- A) Alterations in blood pH; peripheral edema
  - B) Increased nitrogenous waste levels; decreased glomerular filtration rate (GFR)
  - C) Decreased serum creatinine and blood urea nitrogen (BUN); decreased potassium and calcium levels
  - D) Decreased urine output; hematuria; increased GFR

Ans: B

**Feedback:**

The hallmark of acute renal injury is azotemia, an accumulation of nitrogenous wastes such as creatinine, urea nitrogen, and uric acid, plus a decrease in the GFR of the kidneys. While pH alterations, edema, electrolyte imbalances, and decreased urine output may accompany acute renal failure, they are all potentially attributable to other pathologies. Creatinine, GFR, and BUN would unlikely rise during renal failure.

2. Which of the following clients would be considered to have a significant risk of developing the prerenal form of acute renal failure? Select all that apply.
- A) A 22-year-old male who has lost large amounts of blood following a workplace injury
  - B) A 41-year-old female who is admitted for intravenous antibiotic treatment of pyelonephritis
  - C) A 79-year-old male with diagnoses of poorly controlled diabetes mellitus and heart failure
  - D) A 20-year-old male who is admitted for treatment of an overdose of a nephrotoxic drug
  - E) A 68-year-old male with a diagnosis of benign prostatic hyperplasia (BPH)
  - F) An 80-year-old female who has been admitted for the treatment of dehydration and malnutrition

Ans: A, C, F

**Feedback:**

Hemorrhage, heart failure, and dehydration (hypovolemia) are all noted contributors to prerenal failure. Pyelonephritis and damage from nephrotoxic drugs would more likely result in intrinsic renal failure, while BPH is postrenal in nature.

3. The clinical nurse educator on a nephrology unit of a large, urban hospital is orientating recent nursing graduates to the unit. Which of the following teaching points about acute tubular necrosis (ATN) should the educator include in the orientation session?
- A) "The cardinal signs of ATN are oliguria and retention of potassium, creatinine, and sulfates."
  - B) "Ureteral and bladder outlet obstructions are often contributors to ATN."
  - C) "Trauma, burns, and major surgery are common precursors to ATN."
  - D) "Tubular epithelial cells are sensitive to ischemia and toxins, and damage is irreversible."

Ans: C

**Feedback:**

ATN is often preceded by major surgery, burns, or trauma. Many cases of ATN are nonoliguric, and obstructions that are postrenal in nature are not common causes of ATN. Damage to tubular epithelial cells is not necessarily irreversible.

4. Which of the following patients scheduled for an interventional radiology procedure requiring administration of radiocontrast dye would be considered at high risk for nephrotoxicity? Select all that apply.
- A) A 14-year-old with severe abdominal pain
  - B) A 25-year-old with a history of glomerular nephritis who is complaining of severe flank pain
  - C) A 67-year-old diabetic undergoing diagnostic testing for new-onset proteinuria
  - D) A 45-year-old with elevated liver enzymes possibly due to fatty liver cirrhosis
  - E) A 53-year-old male undergoing biopsy for a suspicious "spot" on his chest x-ray

Ans: B, C

**Feedback:**

Radiocontrast media-induced nephrotoxicity is thought to result from direct tubular toxicity and renal ischemia. The risk for renal damage caused by radiocontrast media is greatest in older adults and those with preexisting kidney disease, volume depletion, diabetes mellitus, and recent exposure to other nephrotoxic agents.

5. A 35-year-old female ultramarathon runner is admitted to the hospital following a day-long, 50-mile race because her urinary volume is drastically decreased and her urine is dark red. Tests indicate that she is in the initiating phase of acute tubular necrosis.

Why is her urine red?

- A) Hematuria
- B) Hemoglobinuria
- C) Myoglobinuria
- D) Kidney bleeding

Ans: C

**Feedback:**

Myoglobinuria, which can cause acute tubular necrosis via intratubular obstruction, involves the leaching of myoglobin from skeletal muscle into the urine, bypassing the usual filtration by the glomerulus. Excess exercise and muscle trauma can contribute to this. While both hemoglobinuria and myoglobinuria discolor the urine, hemoglobinuria results from hemolysis following a reaction to a blood transfusion, whereas myoglobinuria involves muscle damage.

6. Following the diagnosis of acute renal failure, the nurse knows that one of the earliest manifestations of residual tubular damage is which of the following lab/diagnostic results?

- A) Elevated blood urea nitrogen (BUN)
- B) Serum creatinine elevation
- C) Inability to concentrate urine
- D) Reduced glomerular filtration rate

Ans: A

**Feedback:**

Urine tests that measure urine osmolality, urinary sodium concentration, and fractional excretion of sodium help differentiate prerenal azotemia, in which the reabsorptive capacity of the tubular cells is maintained, from tubular necrosis, in which these functions are lost. One of the earliest manifestations of tubular damage is the inability to concentrate urine. Conventional markers of serum creatinine and urea nitrogen, fractional secretion of sodium to assess glomerular filtration rate (GFR), and urine output do not manifest for 1 to 2 days after the acute renal failure has begun.

7. A family physician is providing care for a 61-year-old obese male who has a history of diabetes and hypertension. Blood work has indicated that the man has a GFR of 51 mL/minute with elevated serum creatinine levels. Which of the following statements will the physician most likely provide the client in light of these results?

A) "We will regularly monitor your kidney function, but most likely your kidneys will be able to compensate on their own and intervention is not required."  
B) "You likely have chronic kidney disease, and there may be urine in your blood until it is controlled."  
C) "Your chronic kidney disease has likely been caused by your diabetes and high blood pressure."  
D) "You're in kidney failure, and I'll be starting dialysis treatment immediately."

Ans: C

**Feedback:**

Diabetes and hypertension are conditions that can cause chronic kidney disease (CKD). While the kidneys do have a remarkable ability to compensate for impaired function, this fact does not mean that treatment would not be undertaken. Hematuria is not a common manifestation of CKD, and the client's GFR of 51 mL/minute does not indicate kidney failure or the need for dialysis.

8. A nurse is collecting a urine specimen prior to measuring the albumin level in a client's urine. A colleague questions the rationale for the test, stating, "I thought albumin was related to liver function, not kidney function." How can the nurse best respond to this statement?

A) "Urine should normally be free of any proteins, and albumin is one of the more common proteins to be excreted in chronic renal failure."  
B) "Urine albumin levels are useful for diagnosing diabetic kidney disease."  
C) "A urine dipstick test will tell us exactly how much albumin is being spilled by the client's kidneys."  
D) "A urine test for albumin allows us to estimate the client's GFR quite accurately."

Ans: B

**Feedback:**

In clients with diabetes, albumin tests are useful adjunctive test of nephron injury and repair. Urine is not normally completely free of proteins, and a urine dipstick does not allow for the quantification of how much albumin is in a sample. Albumin tests do not allow for an accurate indirect indication of GFR.

9. Which of the following clinical manifestations would lead the nurse to suspect the renal failure patient is developing uremia? Select all that apply.

- A) Weakness and fatigue
- B) Lethargy and confusion
- C) Extreme itching
- D) Blood in urine
- E) Urine smell in the stool

Ans: A, B, C

**Feedback:**

Uremia affects all body systems. The symptoms at the onset include weakness, fatigue, nausea, and apathy. These are subtle signs. More severe symptoms include extreme weakness, frequent vomiting, lethargy, and confusion.

10. A hospital client with a diagnosis of chronic renal failure has orders for measurement of her serum electrolyte levels three times per week. Which of the following statements best captures the relationship between renal failure and sodium regulation?

- A) Clients with advanced renal failure are prone to hyponatremia because of impaired tubular reabsorption.
- B) Renal clients often require a sodium-restricted diet to minimize the excretion load on remaining nephrons.
- C) Clients with renal failure often maintain high sodium levels because of decreased excretion.
- D) Restricting sodium intake helps to preserve nephron function and has the additional benefit of lowering blood pressure.

Ans: A

**Feedback:**

The compromised ability of the tubular nephrons to reabsorb sodium predisposes renal clients to low serum sodium levels. A sodium restriction is thus not normally indicated.

11. Which of the following clients' diagnostic blood work is most suggestive of chronic kidney disease (CKD)?

- A) A client with high pH; low levels of calcium; and low levels of phosphate
- B) A client with low vitamin D levels; low calcitriol levels; and elevated parathyroid hormone (PTH) levels
- C) A client with low bone density; low levels of calcium; and low levels of phosphate
- D) A client with low potassium levels; low calcitriol levels; and increased PTH levels

Ans: B

**Feedback:**

CKD is associated with low vitamin D and calcitriol levels, which induces increased PTH production. CKD is also associated with acidosis (low pH), high levels of phosphate, and hyperkalemia.



12. Which of the following medications would the nurse anticipate being prescribed for the renal failure patient who has hyperphosphatemia?

- A) Vitamin D (calcitriol)
- B) Calcium carbonate
- C) Levothyroxine (Synthroid)
- D) Sensipar (Cinacalcet)

Ans: B

**Feedback:**

Phosphate-binding antacids (aluminum salts, calcium carbonate, or calcium acetate) may be prescribed to decrease the absorption of phosphate from the GI tract.

13. To maintain hematocrit levels in people with kidney failure, the nurse should be prepared to

- A) arrange for frequent blood transfusions in an outpatient clinic.
- B) administer iron dextran intravenously.
- C) administer a subcutaneous injection of recombinant human erythropoietin (rhEPO).
- D) administer prenatal vitamins twice a day.

Ans: C

**Feedback:**

Recombinant human erythropoietin (rhEPO) helps maintain hematocrit levels in people with kidney failure. Secondary benefits include improvement in appetite, energy level, sexual function, skin color, and hair and nail growth, and reduced cold intolerance. Blood transfusion is a treatment if symptomatic with low hemoglobin; however, they try to prevent this by giving EPO or IV iron dextran if there is severe iron deficiency anemia. Prenatal vitamins are high in vitamins but not helpful to renal failure patients.

14. A nurse educator is performing client education with a 51-year-old man who has been recently diagnosed with chronic kidney disease. Which of the following statements by the client would the nurse most likely want to correct or clarify?
- A) "I'll be prone to anemia, since I'm not producing as much of the hormone that causes my bones to produce red blood cells."
  - B) "My heart rate might go up because of my kidney disease, and my blood might be a lot thinner than it should be."
  - C) "My kidney problems increase my chance of developing high blood pressure or diabetes."
  - D) "I'll have a risk of either bleeding too easily or possibly clotting too quickly, though dialysis can help minimize these effects."

Ans: C

**Feedback:**

While high blood pressure can be causative of, or consequent to, renal failure, diabetes is not normally a result of existing CKD. Persons with renal failure are indeed prone to anemia, increased heart rate, decreased blood viscosity, and coagulopathies. The risk of bleeding and thrombotic disorders can be partially mitigated by dialysis.

15. The nurse assessing a renal failure patient for encephalopathy caused by high uremic levels may observe which of the following clinical manifestations?
- A) Severe chest pain with pericardial friction rub on auscultation
  - B) Stiff immobile joints and contractures
  - C) Loss of recent memory and inattention
  - D) Pruritus with yellow hue to skin tone

Ans: C

**Feedback:**

Reductions in alertness and awareness are the earliest and most significant indications of uremic encephalopathy. These often are followed by an inability to fix attention, loss of recent memory, and perceptual errors in identifying people and objects. Answer choice A refers to pericarditis; answer choice B refers to arthritis; answer choice D refers to liver involvement.

16. Which of the following phenomena contributes to the difficulties with absorption, distribution, and elimination of drugs that are associated with kidney disease?
- A) Reductions in plasma proteins increase the amount of free drug and decrease the amount of protein-bound drug.
  - B) Acute tubular necrosis is associated with impaired drug reabsorption through the tubular epithelium.
  - C) Decreased retention by the kidneys often renders normal drug dosages ineffective.
  - D) Dialysis removes active metabolites from circulation minimizing therapeutic effect.

Ans: A

**Feedback:**

A decrease in plasma proteins, particularly albumin, that occurs in many persons with renal failure results in less protein-bound drug and greater amounts of free drug. Drug elimination problems do not stem as directly from impaired tubular reabsorption, decreased retention, or the process of dialysis.

17. A 42-year-old male has been diagnosed with renal failure secondary to diabetes mellitus and is scheduled to begin dialysis soon. Which of the following statements by the client reflects an accurate understanding of the process of hemodialysis?
- A) "It's stressful knowing that committing to dialysis means I can't qualify for a kidney transplant."
  - B) "I know I'll have to go to a hospital or dialysis center for treatment."
  - C) "Changing my schedule to accommodate 3 or 4 hours of hemodialysis each day will be difficult."
  - D) "I won't be able to go about my normal routine during treatment."

Ans: D

**Feedback:**

Hemodialysis requires the client to remain connected to dialysis machinery, whereas peritoneal dialysis allows for activity during treatment. Dialysis does not disqualify an individual from receiving a transplant. Dialysis does not require attendance at a dialysis center, and patients can be taught to perform the dialysis in their home with a family member in attendance. Hemodialysis is normally conducted three times weekly, not once per day.

18. Following kidney transplantation, the patient is prescribed maintenance immunosuppressive therapy consisting of prednisone, azathioprine, and cyclosporine. Educating the patient about long-term maintenance on immunosuppressive therapy should include discussion of side effects that may include: (Select all that apply).
- A) cardiovascular complications.
  - B) increased risk of developing cancer.
  - C) nephrotoxicity of a newly transplanted kidney.
  - D) development of moon face and buffalo hump.
  - E) ringing or buzzing of the ears.

Ans: A, B

**Feedback:**

Mostly all immunosuppressive drugs have serious side effects such as CV complications, metabolic dysfunction, and cancer. Rarely do these medications harm the newly transplanted kidney. Distracter D lists classic s/s of Cushing syndrome. Ringing or buzzing of the ears can be associated with ibuprofen intake.

19. A 1-year-old baby boy with renal dysplasia risks end-stage renal disease unless intervention occurs. Which of the following treatment options is his care team most likely to reject?
- A) Dietary restriction plus erythropoietin
  - B) Continuous cyclic peritoneal dialysis
  - C) Renal transplantation
  - D) Continuous ambulatory peritoneal dialysis

Ans: A

**Feedback:**

Renal transplantation and dialysis are recommended for children; of these, transplantation is the preferred treatment. Conservative measures are inappropriate in this age group because of the importance of fostering proper bone growth, especially in the first 2 years, and appropriate cognitive development, which is at risk due to issues such as uremic encephalopathy and the effect of renal failure upon the central nervous system of the developing child.

20. Which of the following clinical findings among older adults is most unlikely to warrant further investigation and possible treatment?

- A) An 81-year-old male's serum creatinine level has increased sharply since his last blood work.
- B) A 78-year-old female's GFR has been steadily declining over several years.
- C) A 90-year-old female's blood urea nitrogen (BUN) is rising.
- D) An 80-year-old male whose urine dipstick reveals protein is present.

Ans: B

**Feedback:**

A gradual decrease in GFR is considered a normal age-related change. Increased creatinine or BUN would warrant follow-up, as would the presence of protein in a client's urine.

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## Chapter 35- Disorders of the Bladder and Lower Urinary Tract

1. When explaining about the passage of urine to a group of nursing students, the clinic nurse asks them which muscle is primarily responsible for micturition? Their correct reply is the

A) urinary vesicle.  
B) trigone.  
C) detrusor.  
D) external sphincter.

Ans: C

**Feedback:**

The detrusor muscle is the muscle of micturition. When it contracts, urine is expelled from the bladder. External sphincter is a circular muscle that surrounds the urethra distal to the base of the bladder and can stop micturition when it is occurring. Trigone is a smooth triangular area that is bounded by the ureters and the urethra. Urinary vesicle is another name for the bladder.

2. During male ejaculation, which of the following statements addresses why sperm is not normally seen inside the bladder?

A) The parasympathetic nervous system keeps the seminal fluid inside the urethra.  
B) The musculature of the trigone area, bladder neck, and prostatic urethra contract at the same time.  
C) With ejaculation, the male expels some urine along with the seminal fluid to wash any extra sperm out of the bladder.  
D) The detrusor muscle relaxes allowing for the closing of the sphincter at the base of the bladder.

Ans: B

**Feedback:**

During male ejaculation, which is mediated by the SNS, the musculature of the trigone area and that of the bladder neck and prostatic urethra contracts and prevents the backflow of seminal fluid into the bladder.

3. A 61-year-old woman who has had an upper respiratory infection for several weeks has presented to her family physician with complaints of a recent onset of urinary retention. She reveals to her physician that she has been taking nonprescription cold medications over and above the suggested dose for the past 2 weeks. Which of the following phenomena will her physician most likely suspect is contributing to her urinary retention?
- A) Cholinergic actions of the cold medicine are triggering internal and external sphincter contraction.
  - B) Antihistamine effects inhibit communication between the pons and the thoracolumbar cord.
  - C) The anticholinergic effects of the medication are impairing normal bladder function.
  - D) Over-the-counter medications such as cold medicine stimulate the parasympathetic nervous system and inhibit bladder emptying.

Ans: C

**Feedback:**

Many over-the-counter cold medications have an anticholinergic effect that interferes with normal bladder emptying. These effects on micturition are not a result of cholinergic actions or miscommunication between the pontine micturition center and the spinal cord. Stimulation of the parasympathetic nervous system would tend to increase rather than decrease bladder emptying.

4. An 82-year-old resident of a long-term care facility with a recent history of repeated urinary tract infections and restlessness is suspected of having urinary retention. Which of the following actions by the care team is most appropriate?
- A) Uroflowmetry to determine the rate of the client's urine flow
  - B) Ultrasound bladder scanning to determine the residual volume of urine after voiding
  - C) Renal ultrasound aimed at identifying acute or chronic kidney disease
  - D) Urinalysis focusing on the presence of or absence of microorganisms, blood, or white cells in the man's urine

Ans: B

**Feedback:**

Ultrasound bladder scanning yields a fast and noninvasive indication of whether or not an individual is adequately emptying his or her bladder with each void. Uroflowmetry would be less indicative of whether the man is retaining, and renal ultrasound would address deficits in urine production rather than bladder emptying. Urinalysis would be useful in the diagnosis of infections and/or renal issues more than deficiencies in bladder emptying.

5. When explaining a cystometry test to measure bladder pressure during filling and voiding in a normal adult, the nurse informs the nursing students that the normal capacity when adults have a desire to void is
- A) 100 to 150 mL.
  - B) 200 to 250 mL.
  - C) 300 to 399 mL.
  - D) 400 to 500 mL.

Ans: D

**Feedback:**

The desire to void occurs when the bladder is full (normal capacity is approximately 400 to 500 mL). At this point, a definite sensation of fullness occurs; the pressure rises sharply to 40 to 100 cm H<sub>2</sub>O; and voiding occurs around the catheter.

6. Which of the following individuals are likely to display identified risk factors for the development of lower urinary tract obstruction? Select all that apply.
- A) A 32-year-old woman who had a healthy delivery of her third child 4 months ago
  - B) A 68-year-old man who has been diagnosed with benign prostatic hyperplasia (BPH)
  - C) A 55-year-old man with diabetes who is receiving diuretic medications for the treatment of hypertension
  - D) A 30-year-old woman who has been diagnosed with gonorrhea
  - E) A 74-year-old woman who has developed a lower bowel obstruction following several weeks of chronic constipation
  - F) A 20-year-old man who has spina bifida and consequent impaired mobility.

Ans: B, D, E, F

**Feedback:**

BPH frequently obstructs the urethra, while sexually transmitted diseases, bowel obstructions, and spina bifida are also associated with physical blockages of the lower urinary tract. Postpartum women and individuals receiving diuretics would be more likely to be at risk for incontinence rather than urinary retention.



7. A 68-year-old woman with a new onset of vascular dementia has recently begun retaining urine. Which of the following physiological phenomena would her care providers most realistically expect to currently occur as a result of her urinary retention?
- A) Hypertrophy of the bladder muscle and increased bladder wall thickness
  - B) Decreased urine production and nitrogenous waste excretion by the kidneys
  - C) Decompensation, bladder stretching, and high residual urine volume
  - D) Overflow incontinence and loss of contraction power

Ans: A

**Feedback:**

Early accompaniments to urinary retention include hypertrophy of the bladder muscle and increased thickness of the bladder wall. Renal effects are unlikely, and decompensation and loss of contraction power are most often later rather than early effects.

8. A 51-year-old woman diagnosed with a cerebrovascular accident (CVA) 5 months prior is distressed that she has had several recent episodes of urinary incontinence. She has asked her nurse practitioner why this is the case. Which of the following statements best captures the fact that would underlie the nurse's response to the client?
- A) Neurological diseases like MS often result in flaccid bladder dysfunction.
  - B) She may be unable to sense her bladder filling as a result of her MS.
  - C) Lesions to the basal ganglia or extrapyramidal tract associated with MS inhibit detrusor contraction.
  - D) Pathological reductions in bladder volume brought on by MS necessitate frequent micturition.

Ans: B

**Feedback:**

MS may result in neurogenic bladder characterized by an inability to sense filling and consequent incontinence. She is not demonstrating the signs of a flaccid bladder, and lesions to the basal ganglia or extrapyramidal tract are associated with Parkinson disease, not MS. Her disease is unlikely to directly reduce bladder volume.

9. A patient who has suffered a spinal cord injury at C4 is experiencing a sudden change in condition. His BP is 186/101; heart rate is 45; and he is profusely sweating and complaining of “not feeling right.” The nurse should
- A) call a “Code Blue.”
  - B) page physician stat. and ask for an antihypertensive medication.
  - C) palpate his bladder for overdistention.
  - D) place his bed flat and elevate the foot of the bed.

Ans: C

**Feedback:**

The most common causes of spastic bladder dysfunction are spinal cord lesions such as spinal cord injury, herniated intervertebral disk, vascular lesions, tumors, and myelitis. Because the injury interrupts CNS control of sympathetic reflexes in the spinal cord, severe hypertension, bradycardia, and sweating can be triggered by insertion of a catheter or mild overdistention of the bladder. The patient does not qualify for a Code Blue since he still has a pulse and is breathing. Antihypertensive medication is not necessary if the bladder is emptied. Placing him flat with the foot of the bed elevated will not help this situation.

10. A middle-aged man with diabetes reports that he must strain to urinate and that his urine stream is weak and dribbling. He also reports feeling that his bladder never really empties. The nurse knows that all of his complaints are likely caused by which of the following medical diagnoses?
- A) Detrusor muscle areflexia
  - B) Detrusor–sphincter dyssynergia
  - C) Uninhibited neurogenic bladder
  - D) Bladder atony with dysfunction

Ans: D

**Feedback:**

Diabetes causes peripheral neuropathy, which can affect the sensory axons of the urinary bladder. Bladder atony with dysfunction is a frequent complication of diabetes mellitus.

11. A diabetes education nurse is teaching a group of recently diagnosed diabetics about the potential genitourinary complications of diabetes and the consequent importance of vigilant blood glucose control. Which of the following teaching points best conveys an aspect of bladder dysfunction and diabetes mellitus?

A) "People with diabetes are highly susceptible to urethral obstructions, and these can heal more slowly and cause more damage than in people without diabetes."  
B) "High blood sugar results in a high glucose level in your urine, and this can make your bladder muscle less able to fully empty the bladder."  
C) "Many people with diabetes find it necessary to live with an indwelling catheter to ensure their bladders do not become too full."  
D) "It's important for you to empty your bladder frequently because diabetes carries risks of kidney damage that can be exacerbated by incomplete bladder emptying."

Ans: D

**Feedback:**

Diabetics are vulnerable to peripheral neuropathies that can be somewhat mitigated by regular voiding; they are also especially vulnerable to renal damage from high blood sugars, a situation that is worsened when accompanied by incomplete bladder emptying. Urethral obstructions are not a noted complication of diabetes, and indwelling catheter placement is not normally necessary. High blood sugars do not necessarily yield high-glucose urine, and the bladder deficits associated with diabetes are neurological in nature rather than a result of particular urine chemistry.

12. A 24-year-old man is currently in a rehabilitation facility following a spinal cord injury at level T2. He is discussing his long-term options for continence management. Which of the following statements by the client demonstrates he has a clear understanding of the issue?

A) "Self-catheterization can limit the recovery of my neural pathways that control my voiding if I do it too often."  
B) "It's critical that intermittent catheterization be performed using sterile technique."  
C) "An indwelling catheter certainly would work well, but it comes with a number of risks and possible complications."  
D) "An indwelling urethral catheter is the option that best minimizes my chance of a urinary tract infection."

Ans: C

**Feedback:**

Indwelling catheters carry a risk of infections and kidney stones. Catheterization does not influence the activity of the neural pathways, and intermittent catheterization can be performed using clean technique. Indwelling urethral catheters carry a high risk of urinary tract infections.

13. The nurse should anticipate that a patient diagnosed with spastic bladder dysfunction may be prescribed which of the following medications that will help decrease detrusor muscle tone and increase bladder capacity? Select all that apply.

- A) Ditropan (Oxybutynin), an antimuscarinic drug
- B) Detrol LA (tolterodine tartrate), an antimuscarinic drug
- C) Uroxatral (alfuzosin), an  $\alpha$ -adrenergic antagonist
- D) Flomax (tamsulosin), an  $\alpha$ -blocker
- E) Bactrim (sulfamethoxazole and trimethoprim), antibiotics

Ans: A, B

**Feedback:**

Antimuscarinic drugs, such as oxybutynin, tolterodine, and propantheline, decrease detrusor muscle tone and increase bladder capacity in people with spastic bladder dysfunction. Answer choices C and D are medications prescribed for males with BPH.

14. A 55-year-old man has made an appointment to see his family physician because he has been awakening three to four times nightly to void and often has a sudden need to void with little warning during the day. What is the man's most likely diagnosis and possible underlying pathophysiological problem?

- A) Stress incontinence due to damage to CNS inhibitory pathways
- B) Overactive bladder that may result from both neurogenic and myogenic sources
- C) Overactive bladder due to intravesical pressure exceeding urethral pressure
- D) Overflow incontinence that can result from displacement of the angle between the bladder and the posterior proximal urethra

Ans: B

**Feedback:**

The man's complaints are typical of overactive bladder, a condition that can result from the interaction of both the nervous control of bladder emptying and the muscles of the bladder itself. His symptoms are not characteristic of stress incontinence, and when intravesical pressure exceeds, urethral pressure overflow incontinence results. The angle between the bladder and the posterior proximal urethra is more commonly a factor in the continence of females.

15. Because they strengthen the pelvic floor muscles, Kegel exercises are most likely to help

- A) overflow incontinence.
- B) urge incontinence.
- C) stress incontinence.
- D) mixed incontinence.

Ans: C

**Feedback:**

: Stress incontinence is commonly caused by weak pelvic floor muscles, which allow the angle between the bladder and the posterior proximal urethra to change so that the bladder and urethra are positioned for voiding when some activity increases intra-abdominal pressure. Overflow incontinence results when the bladder becomes distended and detrusor activity is absent. Urge incontinence is probably related to CNS control of bladder sensation and emptying or to the smooth muscle of the bladder. Mixed incontinence, a combination of stress and urge incontinence, probably has more than one cause.

16. An 87-year-old male resident of an assisted living facility has been consistently continent of urine until the last several weeks. Which of the following actions by the care providers at the facility is the most likely priority?

- A) Performing a physical examination and history to determine the exact cause and character of the incontinence
- B) Providing client education focusing on the fact that occasional incontinence is a normal, age-related change
- C) Teaching the resident about protective pads, collection devices, and medications that may be effective
- D) Showing the resident the correct technique for exercises to improve bladder, sphincter, and pelvic floor tone

Ans: A

**Feedback:**

The priority in the treatment of incontinence in the elderly is an acknowledgement that it is not an inevitability and that the exact causes should and most often can be identified. This identification by way of history-taking and examination would supersede teaching about protective devices or exercises.

17. A patient asks the nurse what it means when the doctor said that he had adenocarcinoma of the bladder. Reviewing the pathophysiologic principles behind this type of cancer, the nurse knows
- A) it is a low-grade tumor that is readily cured with bladder surgery.
  - B) after resection of the cancer, the prognosis is excellent with this type of cancer cell.
  - C) that these types of cancer cells are very invasive to the tissue; therefore, the entire bladder must be removed.
  - D) this is a rare but highly metastatic tumor that has a very poor prognosis.

Ans: D

**Feedback:**

Adenocarcinoma is rare and highly metastatic. Answer choices A and B relate to urothelial carcinoma; answer choice C relates to squamous cell carcinoma.

18. When teaching a community education class about the seven warning signs of cancer, the nurse will note that the most common sign of bladder cancer is
- A) inability to empty the bladder fully.
  - B) colic spasms of the ureters.
  - C) painless bloody urine.
  - D) passage of large clots after voiding.

Ans: C

**Feedback:**

The most common sign of bladder cancer is painless hematuria. Gross hematuria is a presenting sign in the majority of people with the disease, and microscopic hematuria is present in most others. Answer choice A refers to flaccid bladder; answer choice B refers to kidney stones; answer choice D refers to clots that are usually seen after surgery such as TURP where bladder irrigation is called for to prevent the clots from blocking urine output.

19. A 63-year-old woman has visited a physician because she has been intermittently passing blood-tinged urine over the last several weeks, and cytology has confirmed a diagnosis of invasive bladder cancer. Which of the following statements by the physician is most accurate?
- A) "There are new and highly effective chemotherapy regimens that we will investigate."
  - B) "Fortunately, bladder cancer has a very low mortality rate, and successful treatment is nearly always possible."
  - C) "It's likely that you'll need surgery, possibly a procedure called a cystectomy."
  - D) "Unfortunately, there are nearly no treatment options for this type of cancer, but we will focus on addressing your symptoms."

Ans: C

**Feedback:**

Surgical interventions are common in the treatment of bladder cancer. Effective chemotherapeutic regimens are not yet available, though there are certainly treatment options. The mortality rate of bladder cancer is high, at around 25%.

20. When educating the patient about possible treatments following surgery for bladder cancer, the nurse might include which of the following chemotherapy options? Select all that apply.
- A) Intravesical chemotherapy with doxorubicin (Adriamycin)
  - B) Intravenous chemotherapy with at least three agents
  - C) Bacillus Calmette-Guérin (BCG) vaccine
  - D) Endocan, a tumor angiogenesis inhibitor

Ans: A, C, D

**Feedback:**

No chemotherapeutic regimens for bladder cancer have been established. Instillation of chemotherapeutic drugs into the bladder is currently done using thiotepa, mitomycin C, and doxorubicin. BCG vaccine causes a significant reduction in the rate of relapse and prolongs relapse-free intervals in people with cancer in situ. Inhibitors of tumor angiogenesis and inhibitors of EGF drugs are proving effective with bladder cancer.

## Chapter 36- Structure and Function of the Gastrointestinal System

1. A 55-year-old man has been diagnosed with a gastroesophageal reflux disease (GERD), in which the function of his lower esophageal sphincter is compromised. Which of the following consequences of this condition is most likely to occur?
  - A) Decreased absorption of ingested foods and fluids
  - B) Impaired control of the gastric emptying rate
  - C) Protrusion of the stomach or regurgitation of stomach contents into the esophagus
  - D) Inappropriate release of gastric enzymes

Ans: C

**Feedback:**

Given that the role of the lower esophageal sphincter is to control the exchange of foods and fluids, a deficit is likely to allow the stomach contents, or the stomach itself, to protrude into the esophagus. Absorption is unlikely to be directly affected, and the sphincter is not responsible for controlling gastric emptying or enzyme secretion.

2. Place the following components of the gastrointestinal tract in the chronological order that a bolus of food would pass through them. Use all the options.
  - A) Ileum
  - B) Pylorus
  - C) Jejunum
  - D) Hiatus
  - E) Cecum
  - F) Duodenum

Ans: D, B, F, C, A, E

**Feedback:**

Ingested food and fluids enter the stomach through the hiatus, exit through the pylorus, and pass through the three subdivisions of the small intestine: the duodenum, jejunum, and ileum. The cecum is a component of the large bowel.



3. While explaining to a group of nursing students what the function of the first mucosal layer of the lower two thirds of the esophagus, the pathophysiology instructor mentions which of the following functions? Select all that apply.

- A) Secretion of mucus to lubricate and protect the inner surface of the alimentary canal
- B) Smooth muscle cells that facilitate movement of contents of the GI tract
- C) Holding the organs in place and storage of fats
- D) Barrier to prevent the entry of pathogenic organisms
- E) A cushioning to protect against injury from sports or car accidents

Ans: A, D

**Feedback:**

The first layer performs numerous functions. These include production of mucus that lubricates and protects the inner surface of the alimentary canal; secretion of digestive enzymes and substances that break down food; absorption of the breakdown products of digestion; and maintenance of a barrier to prevent the entry of noxious substances and pathogenic organism. The facilitation of movement of contents of the GI tract occurs in the third layer while holding the organs in place, and storage of fats occurs in the fourth layer.

4. The instructor asks a group of nursing students to explain the function of the omentum. The students will respond based on which pathophysiologic principle?

- A) It holds organs in place.
- B) It attaches the jejunum and ileum to the abdominal wall.
- C) It has lots of mobility and moves around in the peritoneal cavity with peristaltic movements.
- D) It is mainly there to prevent any noxious substance from inner into the gut.

Ans: C

**Feedback:**

The greater omentum has considerable mobility and moves around in the peritoneal cavity with the peristaltic movements of the intestines. It also cushions the abdominal organs against injury and provides insulation against the loss of body heat. The mesentery holds the organs in place and attaches the jejunum and ileum to the abdominal wall. The mucosal layer acts as a barrier to prevent the entry of noxious substances and pathogenic organisms.

5. When the sympathetic nervous system is stimulated, the interstitial cells of Cajal, pacemaker cells of the GI tract, react by
- A) decreasing amplitude or abolishing the slow waves that control the spontaneous oscillations in membrane potentials.
  - B) increasing the peristaltic motion of the GI tract, thereby causing explosive diarrhea.
  - C) increasing the amount of secretions being entered into each segment of the intestinal tract.
  - D) signaling the vagus nerve to slow down motility and increase absorption of water from the large intestine.

Ans: A

**Feedback:**

The interstitial cells of Cajal that are found in groups between the layers of smooth muscle tissue are hypothesized to function as the pacemakers. These cells display rhythmic, spontaneous oscillations in the membrane potentials, called slow waves, ranging in frequency from approximately 3 per minute in the stomach to 12 per minute in the duodenum. The vagus nerve responds to parasympathetic innervation. GI motility is enhanced because of increased vagal activity that could cause diarrhea.

6. A gastroenterologist is teaching a group of medical students about the enteric nervous system in preparation for a consult on client who has suffered a spinal cord injury. Which of the physician's teaching points is most accurate?
- A) "The myenteric plexus is responsible for controlling the function of each segment of the intestinal tract."
  - B) "The enteric nervous system is made up of the myenteric and submucosal plexuses; these are located in the wall of the GI tract."
  - C) "Sympathetic innervation of much of the GI tract occurs by way of the vagus nerve."
  - D) "Parasympathetic stimulation blocks the release of the excitatory neuromediators and inhibits GI motility."

Ans: B

**Feedback:**

The enteric nervous system consists of the myenteric and submucosal plexuses, which are located within the wall of the gastrointestinal tract. The myenteric plexus is responsible for controlling overall function along the entire length of the gut, while the vagus nerve provides parasympathetic, not sympathetic, innervation. Sympathetic stimulation lessens excitatory neuromediators and inhibits GI motility.

7. A speech therapist is performing a swallowing assessment on a 72-year-old man who has suffered a stroke 3 weeks ago. The man has been NPO (nothing by mouth) since his stroke, and the health care team is considering the introduction of oral food. The speech therapist is cueing the client to swallow to preclude either aspiration of food or pocketing of food in the sides of his mouth. The client most likely to have conscious control over which of the following processes listed below involved in swallowing?
- A) Initiation of primary peristalsis
  - B) Moving the epiglottis back to cover the larynx
  - C) Moving a bolus to the posterior wall of the pharynx
  - D) Moving the bolus backward in the esophagus

Ans: C

**Feedback:**

Moving a bolus to the posterior wall of the pharynx is a component of the oral, or voluntary, phase of swallowing. Initiation of primary peristalsis, moving the epiglottis back to cover the larynx, and moving the bolus backward in the esophagus are all involuntary components of the pharyngeal and esophageal phases of swallowing.

8. A male infant is brought into the clinic because of colic-like symptoms. The mother states he acts like something is hurting. After eating, he vomits most of the feeding and then assumes a fetal position. He is also not gaining weight. The nurse practitioner is thinking that he is displaying clinical manifestations of obstruction and may have which of the following medical diagnoses?
- A) Duodenal ulceration
  - B) Constipation
  - C) Pyloric stenosis
  - D) Erosive esophagitis

Ans: C

**Feedback:**

An example of obstruction is hypertrophic pyloric stenosis, which can occur in infants with an abnormally thick muscularis layer in the terminal pylorus. A defect in the lining of the first part of the small intestine (duodenal ulcer) is usually caused by an infection with a bacterium (germ) called *H. pylori*. When food is ingested and digested but not excreted, it forms a blockage in the colon. Regular bowel movements are needed in order for this not to occur. When bowel movements are irregular, constipation may result. This infant appears to be vomiting his stomach content; therefore, no BM is occurring since no food is being digested in the small intestine. Gastrin provides the major stimulus for gastric acid production. Its action on the lower esophageal sphincter protects the esophageal mucosa when gastric acid levels are elevated. If stomach acids reflux into the esophagus, acid irritation and inflammation cause extensive injuries to the esophagus.

9. A 79-year-old male resident of a long-term care facility has contracted *Clostridium difficile* and is experiencing consequent diarrhea. Auscultation of the man's abdomen indicates hyperactive bowel sounds. What process in the man's small intestine is most likely accompanying his current status?
- A) Pathogenic microorganisms are causing dilation of his small intestine, increasing motility.
  - B) Segmentation waves have become more frequent as a result of his infection.
  - C) Intestinal stasis brought on by infection is preventing his small intestine from sufficiently slowing the rate of motility.
  - D) Inflammation is accompanied by an increase in peristaltic movements of his small intestine.

Ans: D

**Feedback:**

Inflammation of the small intestine is accompanied by an increase in motility, an effect that is the result of increased peristaltic waves. Segmentation waves are responsible primarily for mixing rather than moving food. Neither dilation nor inadequate slowing of passage contents is responsible for the increase in motility.

10. Which of the following statements best communicates the nature of movements in the colon?
- A) The internal and external anal sphincters control the movement of feces into and through the colon.
  - B) Haustrations move the colon contents along with 2- to 3-minute rest periods between movements.
  - C) Segmentation waves ensure that all surfaces of the feces are exposed to the colon surface.
  - D) Large segments of the colon contract as a unit for around 30 seconds.

Ans: D

**Feedback:**

The colon, unlike the small intestine, moves contents by the simultaneous contraction of large segments. The anal sphincters control defecation rather than movements within the colon, and haustrations perform mixing, not motility. Segmentation waves are present in the small intestine.

11. A 42-year-old female client with a long-standing history of chronic nausea and vomiting but a near-insatiable appetite has had her symptoms attributed to an enzyme deficiency. Further diagnostic testing indicates that she has inadequate pancreatic enzyme levels and that her large appetite is due to a lack of enzyme control of food intake inhibition. In which of the following enzymes is the woman most likely deficient?

A) Cholecystokinin  
B) Ghrelin  
C) Gastrin  
D) Secretin

Ans: A

**Feedback:**

Cholecystokinin is responsible for inhibiting food intake as well as stimulating pancreatic enzyme secretion. Ghrelin stimulates food intake, while gastrin stimulates gastric acid production, and secretin inhibits it.

12. A science teacher is talking to a group of fifth graders about the role of “spit.” During the course of the discussion, the teacher asks the students which of the following are functions of saliva?

A) Good protection device if someone is being attacked  
B) Will have more saliva production when anxious, such as right before a test  
C) Has antibacterial action to help keep the mouth clean  
D) Secretes acid to chemically break down fatty foods like French fries  
E) Secretes the enzyme pepsin

Ans: C

**Feedback:**

Saliva has three functions. The first is to protect and lubricate. The second is to provide antimicrobial protection. The third is to initiate digestion of starches by secreting enzymes. If anxious, SNS activity causes dry mouth. Saliva begins breaking down starches (carbohydrates), not fatty foods. The chief cells secrete pepsinogen, which is converted into pepsin, the enzyme that breaks down protein. This occurs in the stomach.

13. Which of the following medications used in the treatment of peptic ulcers and gastroesophageal reflux binds to H<sub>2</sub> receptors and blocks the action of histamine on parietal cells?

A) Cimetidine (Tagamet)  
B) Levbid (hyoscyamine)  
C) Lotronex (alosetron)  
D) Nexium (esomeprazole)

Ans: A

**Feedback:**

Cimetidine is a H<sub>2</sub> receptor blocker used to treat peptic ulcers and GERD. It binds to H<sub>2</sub> receptors and blocks the action of histamine on parietal cells. Levbid and Lotronex are anticholinergics, while Nexium is a proton pump inhibitor that inhibits gastric acid secretion.

14. A 77-year-old woman has been admitted to hospital following several weeks of increasing fatigue. On observation, she is pale, and blood work indicates she has low hemoglobin and red cell counts. Stool tests for occult blood are positive, and following endoscopy, she has been diagnosed with an upper GI bleed that has been shown to originate in her stomach. She admits to regularly exceeding the recommended doses of nonsteroidal anti-inflammatory drugs (NSAIDs) in an effort to control her rheumatoid arthritis. Which of the following phenomena is most likely responsible for her present health problems?

A) NSAIDs increase the gastric production of gastrin, increasing gastric secretions and lowering stomach pH.  
B) Drugs such as NSAIDs increase the H<sup>+</sup> levels and thus decrease gastric pH, resulting in insult to the stomach lining.  
C) NSAIDs, aspirin, and other drugs increase prostaglandin synthesis, resulting in disruption of cellular structures lining the stomach.  
D) NSAIDs can disrupt the permeability of the gastric mucosa, causing hydrogen ions to accumulate in the mucosal cells of the lining.

Ans: D

**Feedback:**

NSAIDs damage the mucosal barrier, allowing hydrogen ions to damage cells of the stomach lining. They do not directly increase gastrin production or H<sup>+</sup> levels, and decreased, not increased, prostaglandin synthesis would potentially compromise the gastric surfaces.

15. Chronic anxiety and stress contribute to ulcers. Which of the following effects of the sympathetic nervous system is most responsible for this effect?
- A) Inhibition of the actions of Brunner glands
  - B) Overstimulation of the oxyntic glands
  - C) Suppression of cholecystokinin
  - D) Inflammation of the parotid glands

Ans: A

**Feedback:**

Brunner glands, which produce large amounts of alkaline mucus that protects the duodenum from acid and digestive enzymes, are strongly affected by sympathetic stimulation, which causes a marked decrease in mucus production. Where the stomach contents and secretions from the liver and pancreas enter the duodenum, deficiency of mucus can cause irritation and, potentially, ulcers. Overstimulation of the oxyntic glands is not produced by the SNS. The hormone cholecystokinin, which is thought in part to control gastric emptying, is released in response to the pH, osmolality, and fatty acid composition of the chyme. The two largest salivary glands are called parotid glands. One is located in each cheek over the jaw in front of the ears. Inflammation of one or more of these glands is called parotitis.

16. Following a 14-day course of broad-spectrum antibiotics for the treatment of sepsis, a 60-year-old woman has developed watery diarrhea. Her care team attributes this to likely elimination of normal intestinal flora by the antibiotics. What other phenomena is most likely accompanying her low levels of normal flora?
- A) Decreased mineral and nutrient absorption; decreased carbohydrate metabolism
  - B) Decreased pH of the stomach; increased pH of the lower GI tract
  - C) Decreased fermentation of undigestible dietary residue; decreased vitamin absorption
  - D) Proliferation of vitamin K; lower GI bleeding

Ans: C

**Feedback:**

Central among the functions of normal intestinal flora are the fermentation of dietary components that are not digestible and the facilitation of vitamin absorption. Mineral and nutrient absorption as well as carbohydrate metabolism are less likely to be affected, while vitamin K production would likely decrease somewhat. pH is unlikely to be affected.

17. A patient has just been diagnosed with pernicious anemia. The patient asks the nurse why his body is not able to absorb vitamin B<sub>12</sub>. The nurse responds,
- A) "You have too many ulcers in your stomach."
  - B) "More than likely, you were born with deficient vitamin B<sub>12</sub> stores."
  - C) "Your stomach is not secreting a substance known as intrinsic factor, which is needed to absorb vitamin B<sub>12</sub>."
  - D) "Your daily intake of high saturated fats is interfering with the stomach's ability to absorb the nutrients that it needs, especially vitamin B<sub>12</sub>."

Ans: C

**Feedback:**

Vitamin B<sub>12</sub> is not absorbed in the absence of intrinsic factor, which is secreted by the parietal cells of the stomach. Ulcers in the stomach do not cause pernicious anemia. This is not a congenital problem, nor does the intake of fats interfere with the secretion of intrinsic factor.

18. A male client complaining of chronic cramping, bloating, and diarrhea has been determined to have a deficiency in brush border enzymes within his small intestine. Which of the following meals or snacks high in carbohydrates and protein will likely exacerbate the client's signs and symptoms?
- A) Grapefruit and prunes
  - B) Tossed salad with an oil and vinegar dressing
  - C) Roast beef and a baked potato
  - D) Tortilla chips and guacamole

Ans: C

**Feedback:**

Brush border enzymes are primarily responsible for the metabolism of carbohydrates and proteins, substances best exemplified by a baked potato and roast beef, respectively. Of the distracters, choice C has both high protein and high carbohydrate content. Distracters A, B, and D are not high in both carbohydrates and proteins.



19. A mom asks her neighbor, a nurse, why every time she takes her daughter (10 years old) out for ice cream she comes home with a stomachache and then experiences a bout of diarrhea. The nurse is thinking that this girl is experiencing
- A) anxiety about increasing too many calories.
  - B) a deficiency of lactase.
  - C) gallbladder disease.
  - D) premature peptic ulcer formation.

Ans: B

**Feedback:**

People with a deficiency of lactase, the enzyme that breaks down lactose, experience diarrhea when they drink milk or eat dairy products. Doubtful the child is anxious about the calories in ice cream. Gallbladder disease s/s usually occur in relation to high saturated fat intake. Peptic ulcer s/s include bloating, vomiting blood, foul coffee ground stools, etc.

20. Which of the following statements best captures an aspect of the process of fat digestion and absorption?
- A) Ingested triglycerides are broken down into absorbable form by gastric lipase.
  - B) Triglycerides are digested with the aid of bile salts.
  - C) Long-chain fatty acids are absorbed directly into the portal blood.
  - D) Stool is not excreted until all fat is absorbed.

Ans: B

**Feedback:**

After breakdown, by pancreatic lipase, triglycerides are absorbed primarily in the upper jejunum. Long-chain fatty acids are absorbed less easily than medium-chain triglycerides, while stool often contains a certain amount of fat.

## Chapter 37- Disorders of Gastrointestinal Function

1. The nurse walks into a room and finds the patient forcefully expelling stomach contents into a wash basin. When documenting this occurrence, the nurse will use the term
  - A) nauseous.
  - B) retching.
  - C) vomiting.
  - D) expatriate.

Ans: C

**Feedback:**

Vomiting or emesis is the sudden and forceful oral expulsion of the contents of the stomach. It is usually preceded by nausea. Nausea is a subjective and unpleasant sensation. Retching consists of rhythmic spasmodic movements of the diaphragm, chest wall, and abdominal muscles. It usually precedes or alternates with periods of vomiting. Expatriate means to banish or withdraw.

2. A middle-aged male walks into the emergency department complaining of chest pain radiating to the neck, shortness of breath, and nausea. His heart rate is 120 and BP is 94/60. The ED physician recognizes the patient is having an acute MI with decreased cardiac output. The nurse identifies the nausea to be in response to
  - A) the patient not having a very high pain tolerance.
  - B) hypoxia exerting a direct effect on the chemoreceptor trigger zone.
  - C) the patient not having digested his meal completely.
  - D) fear of having to make major lifestyle changes.

Ans: B

**Feedback:**

Hypoxia exerts a direct effect on the vomiting center (chemoreceptor trigger zone), producing nausea and vomiting. This direct effect probably accounts for the vomiting that occurs during periods of decreased cardiac output, shock, and environmental hypoxia. We are given no information about the patient's pain tolerance, when he last had a meal, or his routine lifestyle. This patient is going into shock (rapid pulse, low BP) that can result in shunting of blood away from the gut and other organs. During shock, the priority organs for oxygenation include the heart, brain, lungs, and kidneys.

3. A female neonate has been in respiratory distress since delivery and is unresponsive to oxygen therapy. Endoscopy has confirmed a diagnosis of esophageal atresia and tracheoesophageal fistulae (EA/TEF). Which of the following explanations should the care team provide to the infant's parents?

A) "We will have to perform surgery to correct the hole in her throat to make sure that she is able to swallow and breathe normally."  
B) "This problem will require respiratory therapy and supplementary feeding, but it will likely resolve itself over time."  
C) "The biggest risk that your daughter will face until this is fixed is the danger of malnutrition and dehydration."  
D) "The priority in our immediate treatment prior to her surgery will be pain management, as the contents of her stomach can burn her lungs."

Ans: A

**Feedback:**

EA/TFE necessitate surgery and preclude both normal respiration and swallowing. Aspiration is the primary immediate risk and the priority for treatment. Although the infant will require respiratory therapy to assist with proper tube placement and ventilator maintenance, the only effective treatment is surgery. Aspiration of feeding (aspiration pneumonia) is a major complication that can occur immediately and can be life threatening. Maintaining an open airway and adequate gas exchange are the priority nursing diagnoses for this infant.

4. A stroke patient is having difficulty swallowing food and beverages. The patient complains that he feels like "the food is sticking to the back of his throat." Given this information, the priority nursing interventions would be to

A) make the patient "nothing per os" (NPO) and call the physician.  
B) feed the patient while he is sitting in an upright position.  
C) add a thickening agent to all of the patient's beverages.  
D) warrant no action since this is a normal occurrence after a stroke.

Ans: A

**Feedback:**

People with dysphagia usually complain of choking, coughing, or an abnormal sensation of food sticking in the back of the throat or upper chest when they swallow. A neuromuscular cause involves lesions of the CNS, such as a stroke, which often involve the cranial nerves that control swallowing. Feeding in upright position is good once it is determined by swallowing evaluation that the patient can swallow food without it going into the lungs. Likewise, thickening agents help dysphagia patients after a swallow evaluation has been performed. No action could put the patient at risk for aspiration pneumonia.

5. A nurse practitioner is providing care for a male client with a long-standing hiatal hernia. Which of the following statements most accurately captures an aspect of the pathophysiology of hiatal hernias?
- A) Paraesophageal hiatal hernias are common and are normally not treated if the client is asymptomatic.
  - B) The root causes of hiatal hernias are normally treatable with medication.
  - C) If esophageal acid clearance is impaired, esophagitis can result.
  - D) An incompetent pyloric sphincter and high-fat diet are commonly implicated in the development of hiatal hernias.

Ans: C

**Feedback:**

Erosive esophagitis can be a complication of hiatal hernias if esophageal acid clearance is significantly impaired. Paraesophageal hiatal hernias are more serious than the sliding variety and require treatment. The root cause of hiatal hernias, herniation of the stomach through the diaphragm, is not normally amenable to treatment with medication. The pyloric sphincter is not associated with hiatal hernias.

6. After several months of persistent heartburn, a 57-year-old female client has been diagnosed with gastroesophageal reflux disease (GERD). Which of the following treatment regimens is likely to best address the woman's health problem?
- A) Surgical correction of the incompetent pylorus
  - B) Antacids; avoiding positions that exacerbate reflux; a soft-textured diet
  - C) Weight loss and administration of calcium channel blocking medications
  - D) Proton pump inhibitors; avoiding large meals; remaining upright after meals

Ans: D

**Feedback:**

Proton pump inhibitors block the final stage of gastric acid production, effectively controlling the root cause of the esophageal damage associated with GERD. The pylorus is not involved, and a soft diet is not indicated. Calcium channel-blocking drugs would not address the problem. Calcium channel blockers are primarily heart disease drugs that relax blood vessels and increase the supply of blood and oxygen to the heart while also reducing the heart's workload.

7. Parents of a 20-month-old infant report that he refuses food or eats poorly and that he grimaces when he swallows. He also is irritable and cries a lot. The mother is worried that he ate something inappropriate this morning, because he vomited something that looked like coffee grounds. Which of the following health problems would the care team first suspect?

A) Rotavirus infection  
B) Appendicitis  
C) Esophagitis from gastrointestinal reflux  
D) Hirschsprung disease

Ans: C

**Feedback:**

Esophagitis secondary to reflux can cause feeding problems, early satiety, and hematemesis. Infants may demonstrate signs of pain when swallowing and may be irritable and cry frequently. Rotavirus causes diarrhea and vomiting, but not the other symptoms. Appendicitis is inflammation of the appendix. Appendicitis usually starts with the main symptom of pain around the navel that moves to the lower right abdomen. Hirschsprung disease is a blockage of the large intestine due to improper muscle movement in the bowel. It is a congenital condition, which means it is present from birth. In Hirschsprung disease, the nerves are missing from a part of the bowel. One primary s/s is a failure to pass meconium shortly after birth.

8. A 68-year-old African American man who has smoked for at least 50 years reports that lately he feels as though food is getting stuck in his throat. At first, this was a problem just with dry food, but now his morning oatmeal is getting “stuck.” On questioning, he reports drinking at least three alcoholic beverages nearly every day. His problem is most likely

A) achalasia.  
B) squamous cell carcinoma of the esophagus.  
C) dysphagia secondary to scleroderma.  
D) gastrointestinal reflux disease.

Ans: B

**Feedback:**

Squamous cell carcinoma of the esophagus is the seventh leading cause of cancer death among men, particularly black men; mean age at diagnosis is 67 years. Alcohol and tobacco use are the main risk factors for this cancer, and dysphagia is a common presenting complaint. An esophageal motility disorder involves the smooth muscle layer of the esophagus and the lower esophageal sphincter (LES). Achalasia is characterized by difficulty swallowing and regurgitation. GERD (gastroesophageal reflux disease) is a condition that causes the esophagus to become irritated and inflamed. Clients with GERD usually feel a burning in the chest or throat called heartburn. Sometimes, they taste stomach fluid in the back of the mouth.

9. A male patient has just been diagnosed with esophageal cancer. He knew that he was losing weight and fatigued most days, but he just attributed it to aging and working. The physician recommends chemotherapy and irradiation. However, the cancer has already metastasized. The patient asks the nurse what he can expect if he agrees to the treatments. The nurse responds,
- A) "The therapies may shrink the cancer."
  - B) "The doctor is prescribing treatment measures to help you swallow better."
  - C) "These therapies will most likely cure your cancer."
  - D) "You need to talk with your physician some more. I will page him for you."

Ans: A

**Feedback:**

The prognosis for people with cancer of the esophagus, although poor, has improved. Even with modern forms of therapy, the long-term survival is limited because, in many cases, the disease has already metastasized by the time the diagnosis is made. These therapies may help with food consumption, but that is not their primary purpose. Nor, will these therapies cure the cancer.

10. A 43-year-old male client has presented to the emergency department with vomiting that he claims is of a sudden onset. The client also states that the emesis has often contained frank blood in the hours prior to admission. His vital signs are stable with temperature 98.3°F, pulse 88, BP 140/87, and respiratory rate 18. Which of the following potential contributing factors would the health care team suspect first?
- A) Overuse of antacids
  - B) Alcohol consumption
  - C) Staphylococcal enterotoxins
  - D) Effects of *Helicobacter pylori*

Ans: B

**Feedback:**

Acute gastritis associated with alcohol use is characterized by intermittent vomiting and the possibility of hematemesis. Aspirin and *H. pylori* do not normally cause such an acute symptom onset, and infectious organisms do not normally cause bleeding of the stomach lining. A combination of calcium carbonate and magnesium is commonly found in antacids. Overdose of antacids can result in irregular heartbeat, poor balance, shallow, rapid breathing and stupor (lack of alertness).

11. A patient has recently been diagnosed with *H. pylori* gastritis. The nurse knows that this form of gastritis is usually treated with a combination of an antibiotic and
- A) antianxiety medications.
  - B) proton pump inhibitors.
  - C) lactulose, to reduce the blood ammonia levels.
  - D) calcium carbonate, an antacid.

Ans: B

**Feedback:**

*H. pylori* is associated with an increased risk of gastric adenocarcinoma, gastric atrophy, and peptic ulcer. It is less likely to contribute to IBD, esophagitis, or diverticular disease. Eradication of *H. pylori* is difficult. Treatment requires a combination therapy that includes the use of antibiotics and a proton pump inhibitor. The proton pump inhibitors have direct antimicrobial properties against *H. pylori*. Antianxiety medications will not kill the bacteria. *H. pylori* is not associated with elevated blood ammonia levels. Calcium carbonate is usually given to relieve heartburn caused by GERD.

12. Following a history of gastric pain and an endoscopy, a client has been diagnosed with a duodenal peptic ulcer. Which of the following teaching points should his caregiver provide?
- A) "While your diet most certainly contributed to this problem, the good news is that changing your diet can help solve it."
  - B) "Ulcers like yours do not penetrate all layers of the stomach or duodenum, so you don't have to worry about losing too much blood."
  - C) "Your family history, your smoking history, and NSAID use may all have contributed to this problem."
  - D) "While there aren't really any effective medications for these ulcers, changes in lifestyle can keep them well controlled."

Ans: C

**Feedback:**

Family history, NSAID use, and smoking have all been identified as contributing factors in the development of peptic ulcers. Diet therapy has not been shown to be effective, and duodenal peptic ulcers are more common than the gastric variant. Perforation occurs when an ulcer erodes through all layers of the stomach or duodenum wall. When perforation occurs in older adults, their mortality is significantly increased. Effective medication regimens are available with antacids, H<sub>2</sub>-receptor antagonists or proton pump inhibitors being the most common medications used.

13. Which of the following clients is most clearly displaying the signs and symptoms of irritable bowel disease (IBD)?
- A) A 32-year-old mother who complains of intermittent abdominal pain that is worse during her menstrual period
  - B) A 51-year-old male who states that his stomach pain is in his lower abdomen, “comes and goes,” and “feels more like a cramp than a dull ache”
  - C) A 44-year-old man who works the evening shift at a factory and who states that his lower abdominal pain is much worse at night than during the day
  - D) A 24-year-old man who has a stressful job but whose diarrhea and cramping do not worsen during periods of high stress

Ans: B

**Feedback:**

IBD is commonly manifested as intermittent lower abdominal pain that feels like cramping. Defecation normally relieves the pain, and symptoms are normally not present at night or during sleep. Stress commonly exacerbates symptoms.

14. A 28-year-old man presents with complaints of diarrhea, fecal urgency, and weight loss. His stool is light colored and malodorous, and it tends to float and be difficult to flush. He has also noted tender, red bumps on his shins and complains of pain and stiffness in his elbows and knees. Sigmoidoscopy reveals discontinuous, granulomatous lesions; no blood is detected in his stool. Which of the following diagnoses would his care team first suspect?
- A) Crohn disease
  - B) Ulcerative colitis
  - C) Diverticulitis
  - D) Colon cancer

Ans: A

**Feedback:**

Crohn disease, like ulcerative colitis, causes diarrhea, fecal urgency, weight loss, and systemic symptoms such as erythema nodosum and arthritis. Unlike ulcerative colitis, it also causes steatorrhea but is not as likely to cause blood in the stool. The granulomatous “skip” lesions confirm the diagnosis of Crohn disease. Neither diverticulitis nor colon cancer would cause this combination of symptoms and signs.



15. A 20-year-old woman has visited her family physician due to occasional bouts of bloody diarrhea over the past several weeks, a phenomenon that she experienced 2 years prior as well. Her physician has diagnosed her with ulcerative colitis based on her history and visualization of the affected region by colonoscopy and sigmoidoscopy. Which of the following pathophysiological phenomena is most likely to underlie the client's health problem?
- A) Fissures and crevices developing in the mucosa that are seen as a characteristic “cobblestone” appearance
  - B) Erosion of the endothelial lining of the distal small intestine by a combination of genetic, autoimmune, and environmental factors
  - C) Compromise of the mucosal layer of the large intestinal surface by the effects of *H. pylori*
  - D) Mucosal hemorrhages that have developed into crypt abscesses, which have in turn necrotized and ulcerated

Ans: D

**Feedback:**

The etiology and course of ulcerative colitis involves mucosal hemorrhages developing into crypt abscesses, with consequent necrosis and ulceration. “Cobblestone” appearance of intestinal mucosa is associated with Crohn disease. Ulcerative colitis is confined to the colon and rectum, and *H. pylori* is not commonly implicated in the etiology.

16. A number of clients on a geriatric subacute medical floor of a hospital have developed foul-smelling diarrhea over the last several days, and subsequent culture of stool samples has confirmed the presence of *Clostridium difficile* in each case. The care team in the unit would recognize that which of the following factors likely contributed to the health problem and would anticipate which of the following treatments?
- A) The use of broad-spectrum antibiotics likely played a role in the development of infections, and most clients would likely receive metronidazole as a treatment.
  - B) Genetic predisposition and the presence of the bacterium in clients' normal flora likely contributed, and treatment would consist of broad-spectrum antibiotics.
  - C) Poor hand washing practice on the part of care providers led to the outbreak, and treatment will consist of hydration and nutritional support.
  - D) Ingestion of contaminated food probably contributed to the infections, and corticosteroids will be needed to treat them.

Ans: A

**Feedback:**

Elimination of the normal intestinal flora by broad-spectrum antibiotics commonly precedes infection by *C. difficile*, and metronidazole is the normal treatment. Neither genetic predisposition nor ingestion of contaminated food is a likely factor. While poor hand hygiene can spread the bacteria, treatment for *C. difficile* necessitates antibiotics and not simply hydration and nutritional support. The treatment of *C. difficile* is with antibiotics. Metronidazole is the drug of choice with vancomycin, being reserved for people who cannot tolerate metronidazole. Corticosteroids will not kill the bacterium.

17. Parents have brought their 7-year-old child into the emergency room with abdominal pain. Which of the following clinical manifestations would lead the health care team to suspect the child has appendicitis? Select all that apply.

- A) Tenderness in right lower quadrant with palpation
- B) Rebound tenderness in inguinal areas with palpation
- C) Redness and warmth over right lower quadrant
- D) Bloating and flatulence noticeable
- E) Urine has the smell of stool with brown coloring

Ans: A, B

**Feedback:**

Appendicitis usually has an abrupt onset. Palpation of the abdomen usually reveals a deep tenderness in the LRQ, which is confined to a small area approximately the size of the fingertip. It usually is located at approximately the site of the inflamed appendix. Rebound tenderness, which is pain that occurs when pressure is applied to the area and then released, and spasm of the overlying abdominal muscles are common. An abscess may display redness and warmth. Bloating and flatulence are usually seen with diverticular disease as is the development of fistula (vesicosigmoid), where stool is seen in the urine.

18. A 22-year-old student has developed a fever and diarrhea while on a backpacking trip in Southeast Asia. His oral temperature is 101.4°F. The diarrhea is bloody, frequent, and small in volume. These clinical manifestations are sufficiently distressing that he is visiting a local medical clinic in the area. Which of the following diagnoses best characterizes this health problem?

- A) Noninflammatory diarrhea
- B) Inflammatory diarrhea
- C) Factitious diarrhea
- D) Secretory diarrhea

Ans: B

**Feedback:**

Inflammatory diarrhea is often characterized by small-volume diarrhea that is bloody and accompanied by a fever. Noninflammatory diarrhea is normally larger in volume and not bloody. Factitious diarrhea is normally attributable to laxative use, and secretory diarrhea is associated with increased secretory processes of the bowel; neither is likely to produce bloody stool.

19. The mother of a 19-week-old infant has brought her baby in for assessment to a pediatrician because of the baby's persistent weight loss and diarrhea. An intestinal biopsy has confirmed a diagnosis of celiac disease, and the child's mother is anxious to know what caused the disease. Which of the following aspects of the etiology of celiac disease would underlie the explanation that the physician provides?
- A) Bacterial or chemical invasion of the peritoneum leads to decreased nutrient absorption and transport.
  - B) An inappropriate T-cell-mediated response results in increased levels of antibodies and an inflammatory response.
  - C) Neurogenic or muscular inhibition of peristalsis results in inappropriate motility of ingested food in the lower small intestine and the colon.
  - D) Inability to process or absorb the fat content of breast milk results in malnutrition and deficiency of fat-soluble vitamins.

Ans: B

**Feedback:**

Celiac disease is rooted in an inappropriate immune response that initiates an inflammatory response, resulting in loss of absorptive villi. Bacterial or chemical invasion of the peritoneum is associated with peritonitis, while inhibition of peristalsis is associated with obstructions. An inability to process or absorb fat is associated with malabsorption syndrome.

20. A 71-year-old male has been recently diagnosed with a stage III tumor of colorectal cancer and is attempting to increase his knowledge base of his diagnosis. Which of the following statements about colorectal cancer demonstrates a sound understanding of the disease?
- A) "If accurate screening test for this type of cancer existed, it could likely have been caught earlier."
  - B) "The NSAIDs and aspirin that I've been taking for many years probably contributing to me getting cancer."
  - C) "While diet is thought to play a role in the development of colorectal cancer, the ultimate causes are largely unknown."
  - D) "A large majority of patients who have my type of colon cancer survive to live many more years."

Ans: C

**Feedback:**

The etiology of cancer of the colon and rectum remains largely unidentified, though dietary factors are thought to exist. The prognosis, especially with stage III tumors, is poor. Simple and accurate screening tests do exist for colorectal cancer, while drugs are not implicated in the etiology.

1. When explaining the role of liver Kupffer cells to a group of nursing students, which of the following statements about the function of these cells is most accurate?
  - A) The primary function of Kupffer cells is to secrete bile.
  - B) These cells are the functional unit of the liver and are responsible for all liver secretions.
  - C) The cells are capable of removing and phagocytizing old and defective blood cells.
  - D) The role of the Kupffer cells is to provide at least 50% of cardiac output each minute to each lobular of the liver.

Ans: C

**Feedback:**

Kupffer cells are reticuloendothelial cells that are capable of removing and phagocytizing old and defective blood cells, bacteria, and other foreign material from the portal blood as it flows through the sinusoid. This phagocytic action removes enteric bacilli and other harmful substances that filter into the blood from the intestine. Small tubular channels in the liver secrete bile. The functional unit of the liver is lobule. Approximately 25% of blood per minute enters the liver through the hepatic artery.

2. A 51-year-old male has been diagnosed with alcohol-induced liver disease. He admits to the nurse providing his care that, "I know what the lungs do, and I know what the heart does, but honestly I have no idea what the liver does in the body." Which of the following statements would best underlie the explanation that the nurse provides?
  - A) The liver is responsible for the absorption of most dietary nutrients as well as the production of growth hormones.
  - B) The liver contributes to the metabolism of ingested food and provides the fluids that the GI tract requires.
  - C) The liver metabolizes most components of food and also cleans the blood of bacteria and drugs.
  - D) The liver maintains a balanced level of electrolytes and pH in the body and stores glucose, minerals, and vitamins.

Ans: C

**Feedback:**

The liver metabolizes protein, carbohydrate, and fat. As well, it metabolizes drugs and removes bacteria by Kupffer cells. Absorption of nutrients takes place in the intestines, and the liver does not produce the bulk of fluids secreted in the GI tract. The liver does not have a primary role in the maintenance of acid-base or electrolyte balance.

3. A patient being seen in the clinic has just received his routine lab results. The patient has been told that his cholesterol level is extremely elevated. The physician plans to give the patient a prescription for medication to help control this condition. Which of the following medications should the nurse prepare to educate the patient on?
- A) Atorvastatin (Lipitor)
  - B) Abilify (aripiprazole)
  - C) Pancrecarb (Pancrelipase)
  - D) Pancrelipase (Ultrase)

Ans: A

**Feedback:**

The HMG-CoA reductase inhibitors or statins are used to treat high cholesterol levels by inhibiting this step in cholesterol synthesis. Abilify is for schizophrenia; Pancrecarb and Pancrelipase are pancreatic enzymes used for pancreatitis.

4. A 48-year-old woman has been diagnosed with extrahepatic cholestasis following a thorough history, ultrasound, and blood work. Which of the following symptoms most likely caused her to seek medical treatment, and what consequence to her health problem would the medical team anticipate?
- A) Complaints of lower flank pain with consequences of impaired fat metabolism
  - B) Anorexia with consequences of impaired drug metabolism and blood filtration
  - C) Skin xanthomas (focal accumulations of cholesterol) with consequences of increased risk of bleeding due to deficient clotting factors
  - D) Pruritus with consequences of deficient levels of fat-soluble vitamins

Ans: D

**Feedback:**

Pruritus is the most common symptom of cholestasis, and deficiencies in fat-soluble vitamins such as A, D, and K are frequent. Flank pain is not a noted complaint, and bile does not contribute to drug metabolism, blood filtration, or clotting factor production.

5. A male infant who is 48 hours postpartum is undergoing phototherapy for the treatment of jaundice and accompanying high levels of bilirubin. Place the following components of the production of bilirubin in the correct chronological order. Use all the options.

A) Conjugated bilirubin  
B) Urobilinogen  
C) Red blood cells  
D) Biliverdin  
E) Free bilirubin

Ans: C, D, E, A, B

**Feedback:**

Hemoglobin from the red blood cell is broken down to form biliverdin, which is rapidly converted to free bilirubin. Inside the hepatocytes, free bilirubin is converted to conjugated bilirubin. Conjugated bilirubin is secreted as a constituent of bile, and in this form, it passes through the bile ducts into the small intestine. In the intestine, approximately one half of the bilirubin is converted into a highly soluble substance called *urobilinogen* by the intestinal flora.

6. A patient has just been admitted to a nursing unit with the diagnosis of obstructive jaundice. Which of the following assessment findings would the nurse expect to see in this patient? Select all that apply.

A) Clay-colored stools  
B) Dark urine  
C) Elevated conjugated bilirubin levels  
D) Decreased serum alkaline phosphatase levels  
E) Severe itching

Ans: A, B, C, E

**Feedback:**

Obstructive jaundice occurs when bile flow is obstructed between the liver and the intestine. Among the causes are strictures of the bile duct, gallstones, and tumors of the bile duct or the pancreas. Conjugated bilirubin levels usually are elevated; the stools are clay colored; the urine is dark; the levels of serum alkaline phosphatase are markedly elevated; and the aminotransferase levels are slightly increased. The accumulation of bile acids in the blood leads to the development of pruritus (itching).

7. A 29-year-old female has been admitted to the emergency department following a suicide attempt by overdose of acetaminophen. What changes in the client's liver and diagnostic results would the care team most likely anticipate?
- A) Hepatocellular necrosis evidenced by increased ALT and AST levels
  - B) Allergic inflammation accompanied by an increase in serum IgE and basophils
  - C) Cholestatic reaction with increased bilirubin count
  - D) Rapid onset of hepatitis and increased GGT, ALT, and bilirubin

Ans: A

**Feedback:**

Acetaminophen is commonly implicated in cases of direct hepatotoxicity, a situation that is characterized by hepatocellular necrosis and increased ALT and AST levels. An allergic-type reaction is associated with idiosyncratic drug reactions, and cholestatic reactions and development of hepatitis are not noted to be associated with acetaminophen.

8. Four weeks after returning from a tropical vacation, a 40-year-old man has presented to the emergency department with malaise, nausea, and "yellow eyes." Serology has confirmed a diagnosis of hepatitis A (HAV), to the shock of the client. What teaching is most appropriate for this client?
- A) "You can expect these symptoms to disappear after about 2 months, but you'll be a carrier of the disease indefinitely."
  - B) "A vaccine before your trip would have prevented this, but be assured your body will rid itself of the virus in time."
  - C) "You likely came in contact with blood or body fluids at some point, and you'll have to ensure no one is subsequently exposed to your own blood or body fluids."
  - D) "You likely got this by way of what we call the 'fecal–oral' route; you will have chronic hepatitis now, but the symptoms can be controlled with medication."

Ans: B

**Feedback:**

HAV is normally self-limiting and does not result in chronic hepatitis or carrier status. A vaccine is available, and the fecal–oral route of transmission, rather than contact with blood and body fluids, is typical.

9. A 53-year-old woman with a history of chronic alcohol abuse but without visible jaundice comes to the clinic complaining of nausea and weakness. She admits to taking acetaminophen for persistent headaches but denies exceeding the recommended daily dose; she has not taken any other medications. She is suspected of having acetaminophen toxicity. Which of the following diagnostic test findings would implicate a different cause of her symptoms?
- A) Normal serum acetaminophen level
  - B) Elevated serum HBsAg level
  - C) Evidence of steatosis on liver biopsy tissue sample
  - D) Hypoglycemia

Ans: B

**Feedback:**

The presence of HBsAg would suggest that this woman is in the prodromal phase of hepatitis B infection. A normal serum acetaminophen level does not preclude toxicity if the drug is taken over a period of time. Steatosis is fatty infiltration of the liver. Steatosis is often but not exclusively an early histological feature of alcoholic liver disease (therefore, with chronic alcohol abuse, the nurse should expect the patient may have steatosis). Drinking heavily without eating can block your liver from releasing stored glucose into your bloodstream, causing hypoglycemia.

10. A male patient comes to the clinic asking to speak to a health care provider privately. He reveals that he had shared a needle/syringe with a prostitute (shooting up cocaine) and then had unprotected sex. Upon questioning, it was revealed that the patient had not had any immunization for hepatitis B. Which of the following medications would the nurse anticipate administering today to this patient?
- A) Tenofovir disoproxil fumarate plus emtricitabine
  - B) Hepatitis B immunoglobulin (HBIG)
  - C) Hepatitis C immunoglobulin (HCIG)
  - D) Hepatitis A vaccine

Ans: B

**Feedback:**

HBIG is used as an adjunct to hepatitis B vaccine for postexposure immunoprophylaxis to prevent HBV infections in high-risk populations. Tenofovir disoproxil fumarate plus emtricitabine is for HIV preexposure coverage. There is no hepatitis C vaccine available on the market yet. Hepatitis A vaccine is for HAV, which is usually spread from fecal-oral routes.



11. A 40-year-old man who uses heroin intravenously was diagnosed with hepatitis C (HCV) 1 year ago and is now considered to have chronic viral hepatitis. Which of the following statements by the client to his care provider would warrant correction?
- A) "I know the medications to treat this aren't fantastic, but at least there are some options for controlling the virus."
  - B) "It's at least a bit reassuring that my liver isn't undergoing damage when I'm not experiencing symptoms."
  - C) "Even though I'm sick, at least I won't feel sick most of the time."
  - D) "I'm not looking forward to all the side effects of the drug treatments for my HCV, but I hope I don't end up needing a liver transplant."

Ans: B

**Feedback:**

Liver damage persists both during symptomatic and asymptomatic periods of acute viral hepatitis. Medications do exist for treatment of the disease, and asymptomatic periods are more common than symptomatic episodes. Side effects of drug treatment are common, and transplant is a potential end-stage treatment option.

12. A 24-year-old woman undergoing a premarital screening test is found to have elevated levels of AST, ALT, and IgG, but no antibody-specific markers for viral hepatitis. A liver biopsy reveals inflammation and cellular damage. Which of the following treatments is most likely to be effective for her?
- A) Lamivudine
  - B) Peginterferon and ribavirin
  - C) Interferon alfa-2b
  - D) Corticosteroids and immunosuppressant drugs

Ans: D

**Feedback:**

This woman's hepatitis is probably caused by an autoimmune disorder rather than a virus. Lamivudine, peginterferon/ribavirin, and interferon alfa-2b are all antiviral agents. Autoimmune hepatitis is a chronic, usually progressive, inflammatory disease of the liver. Corticosteroids are the mainstay of treatment and have been shown to produce remission. Azathioprine, an immunosuppressant medication, is sometimes used along with prednisone. Using both medications may allow you to take a smaller dose of prednisone, reducing its side effects. Most people with this disease require long-term maintenance treatment.

13. A 51-year-old male professional is in the habit of consuming six to eight rum and cokes each evening after work. He assures the nurse practitioner who is performing his regular physical exam that his drinking is under control and does not have negative implications for his work or family life. How could the nurse best respond to the client's statement?
- A) "You are more than likely inflicting damage on your liver, but this damage would cease as soon as you quit drinking."
  - B) "That may be the case, but you are still creating a high risk of hepatitis A or B or liver cancer."
  - C) "In spite of that, the amount of alcohol you are drinking is likely to result first in cirrhosis and, if you continue, in hepatitis or fatty liver changes."
  - D) "When your body has to regularly break down that much alcohol, your blood and the functional cells in your liver accumulate a lot of potentially damaging toxic byproducts."

Ans: D

**Feedback:**

The hepatic effects of alcohol use are related to the accumulation of toxic metabolites in the hepatocytes and blood. Damage can continue even after an individual stops drinking. Specific consequences do not usually include HAV, HBV, or liver cancer. Cirrhosis represents the culmination, not the beginning, of negative hepatic effects.

14. For several years, a 39-year-old female has been averaging two to three bottles of wine each night after her children go to sleep and has included several ounces of brandy in recent years as well. Despite negative consequences to her career and the dissolution of her marriage, her drinking has culminated in a diagnosis of cirrhosis. Which of the following physical manifestations of the health problem would her care team anticipate? Select all that apply.
- A) Ascites
  - B) Anorexia
  - C) Fever
  - D) Bleeding tendencies
  - E) Epigastric pain
  - F) Obesity

Ans: A, B, D, E

**Feedback:**

Ascites, anorexia, bleeding tendencies due to neurological effects, and epigastric pain are common accompaniments to cirrhosis. Ascites occurs when the amount of fluid in the peritoneal cavity is increased and is a late-stage manifestation of cirrhosis and portal hypertension. Epigastric pain is caused by liver enlargement or peritonitis. The peritoneal fluid is seeded with bacteria from the blood or lymph or from passage of bacteria through the bowel wall. Because factors V, VII, IX, and X, prothrombin, and fibrinogen are synthesized by the liver, their decline in liver disease contributes to bleeding tendencies. Fever and obesity would be less likely to exist, as the pathology is not infectious in nature and malnutrition and impaired food metabolism are common.

15. A patient with pancreatic cancer is admitted for portal hypertension in which he is symptomatic with ascites. Following paracentesis and removal of 7.5 L of ascitic fluid, the nurse should anticipate that the physician will order which of the following medications to assist in maintaining an effective circulating fluid volume?

A) Bumetanide (Bumex)  
B) Furosemide (Lasix)  
C) Albumin (human) 5%  
D) Epogen (epoetin alfa)

Ans: C

**Feedback:**

Complications of portal hypertension include ascites, splenomegaly, and hepatic encephalopathy. Following paracentesis, to remove ascitic fluid, a volume expander such as albumin is usually administered to maintain the effective circulating volume. Lasix and Bumex are diuretics that decrease circulating fluid volume. Epogen stimulates red blood cell production and ultimately increases O<sub>2</sub>-carrying capacity.

16. To reduce hepatic blood flow and decrease portal pressures in persons with cirrhosis, the nurse should be prepared to administer which of the following medications?

A) Bevacizumab, an angiogenesis inhibitor  
B) Octreotide, a long-acting synthetic analog of somatostatin  
C) Filgrastim, granulocyte colony-stimulating factor (G-CSF) analog  
D) Diltiazem (Cardizem), a calcium channel blocker

Ans: B

**Feedback:**

Octreotide, a long-acting synthetic analog of somatostatin, reduces splanchnic and hepatic blood flow and portal pressures in persons with cirrhosis. Bevacizumab was the first angiogenesis inhibitor that was shown to slow tumor growth and, more importantly, to extend the lives of patients with some cancers. Filgrastim rapidly reverses neutropenia and maintains normal ANC in patients with HIV infection. Diltiazem is used to treat a variety of conditions, such as high blood pressure, migraines, and Raynaud disease.

17. Which of the following clients in a hospital medical unit is most clearly demonstrating the signs and symptoms of liver failure? An adult with
- A) low hemoglobin levels, low platelet levels, and spider angiomas present.
  - B) blood pressure of 189/103, jaundice, and multiple thromboses.
  - C) sudden onset of confusion, a history of alcohol abuse, and low levels of serum AST and ALT.
  - D) ascites, fever, and recent onset of atrial fibrillation.

Ans: A

**Feedback:**

Anemia, thrombocytopenia, and the presence of spider angiomas are characteristic of liver failure. High blood pressure, excessive clotting, fever, and cardiac arrhythmias are not common symptoms of liver failure, and AST and ALT levels would rise, not fall.

18. Following several days of intermittent upper right quadrant pain, a 29-year-old obese, Native American woman has been diagnosed with cholelithiasis. The nurse at the clinic has taught the client about the pathophysiology and contributing factors to her health problem, as well as some of the likely treatment options. Which of the following statements by the client demonstrates a sound understanding of her diagnosis?
- A) "All in all, I guess this is a result of the fact that I've been eating a diet too high in cholesterol for too long."
  - B) "Several factors like my genetics and gender may have contributed to this, but I'm glad that medications can cure it."
  - C) "This explains why my skin was yellow-tinged lately and why I had those pains that spread to my upper back and right shoulder."
  - D) "I suppose the fever and vomiting I had this week was probably a sign of my gallstones too."

Ans: C

**Feedback:**

Gallstones can be caused by abnormalities in the composition of bile (increased cholesterol) and stasis of bile. The formation of cholesterol stones is associated with obesity and occurs more frequently in women. These factors cause the liver to excrete more cholesterol into the bile. Estrogen reduces the synthesis of bile acid in women. Cholesterol stones are extremely common in Native Americans. Jaundice and pain that radiates to the upper back and right shoulder are noted signs and symptoms of cholelithiasis. While cholesterol is a key element in the formation of gallstones, the particular amount ingested in the diet is not central to the development of the problem. Surgery, not medication, is the normal treatment modality, and fever and nausea are more closely associated with cholecystitis rather than cholelithiasis.

19. While on tour, a 32-year-old male musician has presented to the emergency department of a hospital after a concert complaining of severe and sudden abdominal pain. He admits to a history of copious alcohol use in recent years, and his vital signs include temperature 46.8°C (101.8°F), blood pressure 89/48 mm Hg, and heart rate 116 beats/minute. Blood work indicates that his serum levels of C-reactive protein, amylase, and lipase are all elevated. Which of the following diagnoses would the care team suspect first?

A) Hepatitis C  
B) Cholecystitis  
C) Liver cirrhosis  
D) Acute pancreatitis

Ans: D

**Feedback:**

Alcohol use, fever, hypotension, and tachycardia are often associated with pancreatitis, as are elevated serum amylase and lipase levels. These enzymes would unlikely rise in cases of hepatitis, cholecystitis, or cirrhosis. The precise mechanisms whereby alcohol exerts its action are largely unknown. The capacity for oxidative and nonoxidative metabolism of ethanol by the pancreas and the harmful by-products that result have been related to the disease process. Hepatitis C has an incubation period. Most adults who acquire the infection usually are asymptomatic. Jaundice is uncommon. Direct measurement of HCV in the serum remains the most accurate test for infection. Cirrhosis represents the end stage of chronic liver disease. The end result is liver failure that affects many organs. The patients usually have anemia, thrombocytopenia, endocrine disorders, skin lesions, azotemia and renal failure, and hepatic encephalopathy.

20. A 70-year-old male with a 40 pack-year history of smoking and long-standing non-insulin-dependent diabetes has been diagnosed with pancreatic cancer. Which of the following teaching points should the physician provide?
- A) "While this is indeed serious, you should know that you have a good chance of beating this disease with appropriate treatment."  
B) "Most likely your pattern of high alcohol intake over the years contributed to your cancer."  
C) "You will likely be facing surgery in the near future, but know that this is very unlikely to eliminate your cancer."  
D) "I know it may seem trivial at this point, but the levels of pain that accompany cancer of the pancreas are normally quite low."

Ans: C

**Feedback:**

Surgery is the most common treatment modality for pancreatic cancer, but it does not commonly result in the resolution of the disease. Pancreatic cancer has a very poor prognosis, and alcohol is not a common contributor. Pancreatic cancer is noted to be exceptionally painful.

## Chapter 39- Alterations in Nutritional Status

1. When counseling a group of overweight individuals, the nurse should stress that during parties, the oxidation of alcohol provides how many kilocalorie/gram to one's diet?  
A) 4 kcal/g  
B) 5 kcal/g  
C) 7 kcal/g  
D) 9 kcal/g

Ans: C

**Feedback:**

The oxidation of proteins provides 4 kcal/g; fats, 9 kcal/g; carbohydrates, 4 kcal/g; and alcohol, 7 kcal/g.

2. A dietitian is working with a morbidly obese client in an effort to facilitate weight loss. Which of the dietitian's following teaching points about the nature of adipose tissue should be included in the client education?  
A) "Our ultimate goal is going to be eventually rid your body of adipose tissue or fat."  
B) "Your fat cells can be considered to be one large energy storage organ that also has a role in hormone production."  
C) "We ideally would like to maximize your levels of brown fat and minimize those of white fat."  
D) "Obesity is normally the result of the number of 'pre-fat' cells an individual is born with."

Ans: B

**Feedback:**

Fat cells are collectively considered a large body organ that is metabolically active in the uptake, synthesis, storage, and mobilization of lipids, which are the main source of stored fuel for the body; the role of adipose tissue as an endocrine organ has also been recently elucidated. It is neither a desirable nor reasonable goal to entirely rid the body of fat, given the key roles it plays in homeostasis, and brown fat is not common in postnatal life. Preadipocytes have been shown to play a role in obesity, but the condition is still primarily a consequence of energy intake exceeding output.

3. Which of the following statements most accurately captures an aspect of the basal metabolic rate (BMR)?
- A) The resting BMR constitutes a small fraction of the total body energy needs.
  - B) Females tend to have a lower BMR than males due to a smaller skeletal muscle mass.
  - C) Variations in muscle mass account for much of the differences in the BMR that exist between individuals.
  - D) The BMR remains consistent throughout the life span.

Ans: C

**Feedback:**

Body size and skeletal muscle mass account for most of the individual variations in BMR that exist between individuals. The resting BMR accounts for 50% to 70 % of the total body energy needs, and increased quantities of adipose tissue account for the lower average BMR in females as compared to males. BMR decreases with age.

4. Which of the following clients would be most reasonably expected to have the highest basal metabolic rate (BMR), assuming none is obese or malnourished?
- A) A 22-year-old man, 69 inches tall, who has a sedentary lifestyle
  - B) A 47-year-old woman, 65 inches tall, who swims 1 mile four times a week
  - C) A 29-year-old woman, 61 inches tall, who is pregnant and on bed rest
  - D) A 60-year-old man, 72 inches tall, who is recovering from heart surgery

Ans: D

**Feedback:**

Although age, sex, physical state, and pregnancy are contributing factors, variations in BMR among individuals are chiefly related to skeletal muscle mass and body size. Therefore, regardless of health and fitness status, the tallest and heaviest person in any sample will probably have the highest BMR.

5. When examining the types of energy expenditure, which of the following statements is accurate?
- A) People who are more active and who fidget may have less fat gain than those with decreased nonexercise activity thermogenesis.
  - B) Parasympathetic stimulation will cause brown fat to generate more heat than other stimulations.
  - C) Recent research indicates that obese patients with persistent excess caloric intake have decreased sympathetic activity.
  - D) Carbohydrate intake increases the normal metabolic rate more significantly than other nutrients.

Ans: A

**Feedback:**

Nonexercise activity thermogenesis includes the energy expended in maintaining posture and in activities such as fidgeting. People with increased NEAT may have less fat gain than those with decreased NEAT. Sympathetic stimulation causes brown fat to generate more heat. Research shows that obese patients with excess caloric intake have increased sympathetic activity. Proteins, not carbohydrates, increase metabolic rate more significantly.

6. When explaining the role of protein and the nine essential amino acids' needs of the body to a group of students, the nurse should emphasize that which of the following foods are complete proteins (foods that provide the essential amino acids in adequate amounts)? Select all that apply.
- A) Milk
  - B) Fish
  - C) Poultry
  - D) Nuts
  - E) Grains

Ans: A, B, C, D, E

**Feedback:**

All of the foods listed are complete proteins from both animals and vegetable sources.



7. A 17-year-old female has announced to her family physician a desire to wholly eliminate fats from her diet. Which of the following aspects of the role of fats would underlie the physician's response to the client?
- A) Apart from providing energy, fats are necessary as carriers of certain vitamins and are precursors to prostaglandins.
  - B) An extreme low-fat diet is associated with an increase in undesirable HDL cholesterol.
  - C) Fats are a key source of dietary nitrogen, and their elimination from the diet is associated with a negative nitrogen balance.
  - D) The total elimination of fat from the diet is associated with the development of ketosis.

Ans: A

**Feedback:**

Far from being a completely undesirable component of the diet, dietary fats provide energy, function as carriers for the fat-soluble vitamins, serve as precursors of prostaglandins, and are a source of fatty acids. Low-fat diets tend to lower levels of HDL, which is a desirable form of cholesterol. Nitrogen balance is associated with protein, not fat, intake, and ketosis results from low-carbohydrate intake.

8. The physician has asked a newly diagnosed cardiac patient to begin taking omega-3 fatty acids to help prevent inflammation and blood clotting. The patient asks the nurse what types of food sources are high in omega-3 fatty acids. The nurse should educate the patient to increase his intake of which of the following items? Select all that apply.
- A) Salmon
  - B) Walnuts
  - C) Seeds
  - D) Avocados

Ans: A, B, C

**Feedback:**

All of the foods, except avocados, are rich with omega-3 fatty acids.

9. A 20-year-old male college student has recently finished a Thanksgiving dinner of heroic proportions while home for the holiday weekend. Which of the following phenomena would most likely have produced his sensation of satiety?
- A) Stretch receptors in the stomach and small intestine signal the feeding center in the medulla.
  - B) Increased levels of leptin stimulate a decrease in appetite by way of the vagus nerve.
  - C) The breakdown of products of lipids such as ketoacids produces a decrease in appetite.
  - D) Cholecystokinin and glucagon-like peptide-1 suppress the hunger impulse.

Ans: D

**Feedback:**

The presence of fat in the duodenum and nutrients in the small bowel results in the release of cholecystokinin and glucagon-like peptide-1, respectively, which suppress the feeding center located in the hypothalamus. Leptin and ketoacids are associated with the intermediate and long-term regulation of food intake rather than the short-term control that would signal the end of a meal or snack.

10. A 43-year-old male who is 5'10" tall and weighs 216 lb has been informed by his nurse practitioner that his body mass index (BMI) is 31. Which of the following clinical conclusions based on these data would his nurse be most justified in rejecting?
- A) Further investigation of his nutritional status is needed to supplement the BMI value.
  - B) The client faces an increased risk of type 2 diabetes and hyperlipidemia.
  - C) He is classified as being obese, likely as the result of the interplay of genetic and lifestyle factors.
  - D) The client is borderline obese but is not yet at the point of significantly increased risks to health.

Ans: D

**Feedback:**

A BMI of 31 is classified as obese, and the client faces a risk of hypertension, hyperlipidemia, type 2 diabetes, coronary heart disease, and other health problems. While BMI is a valid instrument, other data sources are needed to supplement this value clinically. Obesity is considered to be an outcome of a variety of factors including heredity and lifestyle.

11. Which of the following statements about types of obesity is most accurate?
- A) Upper body obesity is often referred to as being shaped like a “pear.”
  - B) A waist–hip ratio greater than 1.0 in men can be interpreted to mean upper body obesity.
  - C) Waist circumference is a measurement of subcutaneous abdominal adipose tissue but not intra-abdominal adipose tissue.
  - D) A waist circumference of 40 inches or less in women is considered normal and therefore not associated with increased health risk.

Ans: B

**Feedback:**

A waist–hip ratio greater than 1.0 in men and 0.8 in women indicates upper body or central (abdominal) obesity. Upper body obesity is referred to as being shaped like an apple. Waist circumference measures mostly subcutaneous and intra-abdominal adipose tissue. In males, a waist circumference greater than 40 inches (or 35 inches in females) is associated with increased health risk.

12. A 40-year-old female has been categorized as being obese, with a body mass index (BMI) of 33.2. Which of the following health problems place the client at a significantly increased risk for when compared with individuals with a BMI below 25? Select all that apply.
- A) Cardiac arrhythmias
  - B) Osteoarthritis
  - C) Multiple sclerosis
  - D) Atelectasis
  - E) Gallbladder disease
  - F) Insulin resistance

Ans: B, E, F

**Feedback:**

Obesity is associated with significantly increased risk for osteoarthritis due to bone and joint stress. Insulin resistance and gallbladder disease are also identified consequences of obesity. Cardiac arrhythmias are less likely to result directly from obesity, given their etiology rooted in electrical conductivity. Multiple sclerosis and other neurological effects are also unlikely, and atelectasis is not commonly a direct effect of high levels of body fat.

13. Frustrated with his inability to lose weight despite attempting numerous fad diets, a 42-year-old male who is 5'11" and 270 lb has visited a clinic to gain tools to achieve long-term weight loss. Which of the following statements by the clinician is most accurate?
- A) "Recent findings have determined that obesity is largely genetic and not preventable, but that doesn't mean we can't work together to help you lose weight and keep it off."
  - B) "A combined approach of behavior therapy, changing your lifestyle habits, and increased physical activity gives the highest chance of long-term success."
  - C) "By significantly changing the way you live your life, you could set and meet a goal of losing about 5% of your body weight each month."
  - D) "Combined with regular exercise, a diet of taking in 500 to 1000 kcal/day will be the best approach."

Ans: B

**Feedback:**

A combined approach to weight loss including diet modification, exercise, and drug therapy has been shown to be successful in the treatment of obesity. In spite of a genetic component, obesity is still considered to be preventable. A reasonable rate of weight loss should be 5% to 10% of total body weight over a 6-month period. A reduction in food intake of between 500 and 1000 kcal, not a total food intake of 500 to 1000 kcal, is often necessary in the treatment of individuals with high BMIs. Pharmacotherapy and surgery are available as adjuncts.

14. The patient who has been consuming a very low-calorie diet (VLCD) of 450 kcal/day should be assessed for which of the following high-risk complications? Select all that apply.
- A) Irregular heart rhythms
  - B) Bone/joint inflammation
  - C) Abdominal pain related to gallstones
  - D) Flank pain and spasm associated with kidney sludge
  - E) Elevated cholesterol levels

Ans: A, C

**Feedback:**

VLCDs have higher risks, including abnormal heart rhythms and cholelithiasis. Anyone on this diet should be under direct supervision of a medical professional. Usually bone/joint pain/inflammation decreases with weight loss. Kidney sludge is usually related to the amount of water a person consumes.

15. Which of the following measures would likely be rejected as part of a first-line weight loss plan for a client with a BMI of 30.2, type 2 diabetes, and hypertension?
- A) Prescription drug therapy
  - B) Gastric bypass
  - C) Calorie reduction by 500 to 1000 kcal/day
  - D) 30 minutes or more of moderate-intensity activity at least 3 days per week

Ans: B

**Feedback:**

Weight loss surgery should be limited to individuals with a BMI greater than 40 or those with a BMI greater than 35 with comorbid conditions in whom medical therapy has failed. Calorie reduction is appropriate for anyone with a BMI of 25 to 29.9 plus two risk factors (in this case, type 2 diabetes and hypertension). Prescription drug therapy can be considered for those with a BMI of 30 or more, and increased physical activity, although it does not lead to significant weight loss, helps prevent further weight gain and reduces cardiovascular and diabetes risk beyond that achieved by weight loss alone.

16. During a humanitarian trip to an underdeveloped country, a medical student is assessing a 6-year-old male who has a protuberant abdomen, dry hair, and wrinkled skin. The child's heart rate is 59 beats/minute, blood pressure 89/50, and temperature 95.2°F (35.1°C). What is the most likely etiology of the child's health problems?
- A) A diet lacking in fat-soluble vitamins
  - B) Fluid and electrolyte imbalances secondary to low -carbohydrate intake
  - C) A diet that is low or high in carbohydrates but low in fat
  - D) A diet deficient in both protein and calories

Ans: D

**Feedback:**

The child's presentation is typical of marasmus, a diagnosis caused by deficiencies in protein and calorie intake.

17. A nurse who works on an oncology ward is providing care for a 68-year-old female patient with a diagnosis of lung cancer with bone metastases. The client is experiencing rapid weight loss and is exhibiting the signs and symptoms of malnutrition. The nurse would recognize that which of the following factors is most likely contributing to the client's malnutrition?
- A) Autoimmune responses associated with acute illness are inhibiting anabolism.
  - B) Chronic hypoxia is precluding many of the aerobic processes required in body maintenance and repair.
  - C) Protein mass is being lost from the liver and other organs, and the liver is synthesizing fewer serum proteins.
  - D) Intestinal malabsorption is occurring as a result of tumor metastases.

Ans: C

**Feedback:**

Ill individuals are prone to disruption in protein balance, in which protein breakdown exceeds protein rebuilding. Protein mass is lost from the liver, gastrointestinal tract, kidneys, and heart. As protein is lost from the liver, hepatic synthesis of serum proteins decreases and decreased levels of serum proteins are observed. Autoimmune processes, hypoxia, and malabsorption as a result of metastases are unlikely factors.

18. A 20-year-old male who is addicted to crystal methamphetamine has been admitted to a hospital with a diagnosis of protein–calorie malnutrition after many months of inadequate food intake. Which of the following treatment plans would the care team most likely favor?
- A) Intravenous infusion of albumin coupled with vitamin supplementation
  - B) Total parenteral nutrition
  - C) Incrementally feeding combined with vitamin and mineral supplementation
  - D) Rapid administration of normal saline and carbohydrates

Ans: C

**Feedback:**

Slow administration of protein and calories combined with mineral and vitamin supplementation is important in the treatment of protein–calorie malnutrition. Albumin transfusions and total parenteral feeding would likely not be necessary, and rapid administration of fluids and carbohydrates may precipitate congestive heart failure.

19. A teenage female has been admitted for complications resulting from bulimia nervosa. She has abused laxatives for many years and has been self-inducing vomiting since the age of 9. The nurse's admission assessment should pay close attention to which of the following complications that can arise from this disorder? Select all that apply. Assess for
- A) dry, cracked lips and poor skin turgor.
  - B) missing tooth enamel and increased number of dental cavities.
  - C) painful swallowing and stomach cramping related to reflux and esophagitis.
  - D) fruity breath and labored, deep, gasping respirations.
  - E) jaundice of the skin and eyes.

Ans: A, B, C

**Feedback:**

Distracters A, B, and C are associated with complications of bulimia nervosa. Answer choice A relates to dehydration/fluid volume deficit; answer choice B relates to dental abnormalities associated with high acid content of the vomitus; answer choice C relates to esophagitis. Answer choice D is indicative of DKA primarily caused by undiagnosed or undertreated diabetes. Jaundice of the skin and eyes is usually associated with liver disease.

20. As part of the intake protocol at an eating disorders clinic, an interview precedes a physical examination. Which of the following questions would a clinician be justified in excluding from an intake interview of a 16-year-old female referred by her pediatrician for the treatment of anorexia nervosa?
- A) "Do you remember when your last menstrual period was?"
  - B) "Have you noticed any new hair growth on your body in the last several months?"
  - C) "Have you had any episodes of shortness of breath in the recent past?"
  - D) "Can you tell me about some of the habits that you have related to food in your daily routine?"

Ans: C

**Feedback:**

Respiratory complications are not a noted consequence of anorexia nervosa. Amenorrhea, development of lanugo, and complex and important rituals around food preparation are common.

## Chapter 40- Mechanisms of Endocrine Control

1. Which of the following statements best captures an aspect of the role of hormones in the body?
- A) Some chemical substances can function as hormones or be integrated with the central and peripheral nervous systems.
  - B) Hormones directly initiate many of the processes that contribute to homeostasis.
  - C) Control of body processes is ensured by the fact that a single hormone can only exert one effect on one specific system or tissue.
  - D) Each hormone that exists in the body is produced by only one specific endocrine gland.

Ans: A

**Feedback:**

Some chemicals, such as epinephrine, can both function as a hormone and be closely integrated with the central and peripheral nervous systems as well as the immune systems, leading to current terminology such as “neuroendocrine.” Hormones modulate, but do not initiate, changes in the body, and one hormone may exert multiple effects on multiple body systems. Hormones are produced by a variety of body tissues, not solely by endocrine glands.

2. An example of a single hormone that can exert effects in different tissues, erythropoietin, made in the kidney stimulates the bone marrow to produce
- A) platelets.
  - B) natural killer cells.
  - C) red blood cells.
  - D) mast cells.

Ans: C

**Feedback:**

A characteristic of hormones is that a single hormone can exert various effects in different tissues. For example, erythropoietin, a traditional circulating hormone, is made in the kidney and stimulates erythropoiesis in the bone marrow.



3. A nurse who works in the office of an endocrinologist is orienting a new staff member. Which of the following teaching points is the nurse justified in including in the orientation? Select all that apply.
- A) "A bodily process can be the result of the combined effect of several different hormones from different sources."
  - B) "A single hormone can act not only on one process or organ but often on several different locations or processes."
  - C) "It's common for production of hormones to be far removed from the tissue where they ultimately exert their effect."
  - D) "Sometimes hormones act locally on the area where they were produced, like in the case of paracrine and autocrine actions."
  - E) "The regulation in homeostasis requires that hormones be absent from the body when their effect is not needed."

Ans: A, B, C, D

**Feedback:**

A single hormone can exert various effects in different tissues or, conversely, a single function can be regulated by several different hormones. Hormones act both distant from their source and more locally, as in the case of autocrine and paracrine actions. Hormones are normally present at all times.

4. When explaining about structural classifications to a group of students, the instructor discusses the peptides and proteins. They talk about small hormones and hormones as large and complex as growth hormone (GH), which has approximately how many amino acids involved?
- A) 50 amino acids
  - B) 100 amino acids
  - C) 150 amino acids
  - D) 200 amino acids

Ans: D

**Feedback:**

Growth hormone is a very large and complex protein that has approximately 200 amino acids.

5. Which of the following hormones are derivatives of cholesterol?

- A) Epinephrine and norepinephrine
- B) Insulin and glucagon
- C) Aldosterone and testosterone
- D) Eicosanoids and retinoids

Ans: C

**Feedback:**

Steroids such as aldosterone and testosterone are a classification of hormones that are derived from cholesterol. Epinephrine and norepinephrine are both amino acids, while insulin and glucagon are classified among peptides, polypeptides, proteins, and glycoproteins. Eicosanoids and retinoids consist of fatty acid compounds.

6. A 51-year-old woman has been experiencing signs and symptoms of perimenopause and has sought help from her family physician. A deficiency in estrogen levels has been determined to be a contributing factor. Which of the following phenomena could potentially underlie the woman's health problem?

- A) Sufficient synthesis of estrogen but inadequate vesicle-mediated release
- B) Inadequate synthesis in the rough endoplasmic reticulum of her ovarian cells
- C) Insufficient estrogen production within the smooth endoplasmic reticulum of the relevant cells
- D) A lack of prohormone precursors needed for estrogen synthesis and release

Ans: C

**Feedback:**

Steroids such as estrogen are produced in the smooth endoplasmic reticulum. Synthesis and release are not separate processes as in the case of peptide hormones, and prohormones are associated with peptide, polypeptide, and protein hormones.

7. Which of the following best describes the half-life of a highly protein-bound drug such as thyroxine (99% protein bound)? The half-life would be

- A) much longer to reduce the concentration of the hormone by one half.
- B) shorter because only a little of the hormone has to be used up to reduce the concentration.
- C) dependent on which drugs were in the blood system holding on to the hormone.
- D) dependent on the liver to carry the hormone to its designated target organ.

Ans: A

**Feedback:**

The half-life of a hormone—the time it takes for the body to reduce the concentration of the hormone by one half—is positively correlated with its percentage of protein binding. Thyroxine, which is more than 99% protein bound, has a half-life of 6 days, whereas aldosterone, 15% bound, has a half-life of only 25 minutes.

8. Since steroid hormones are bound to protein carriers for transport, this means
- A) they are water soluble and circulate freely in the blood.
  - B) they are degraded by enzymes in the blood.
  - C) they are inactive in the bound state.
  - D) they will be converted into a useable form by enzymes in the blood.

Ans: C

**Feedback:**

Steroid hormones are bound to protein carriers for transport and are inactive in the bound state. Their activity depends on the availability of transport carriers.

9. Neurotransmitters like catecholamines (*e.g.*, dopamine and epinephrine) have a reaction time of
- A) milliseconds.
  - B) less than 10 minutes.
  - C) 24 to 36 hours.
  - D) 4 to 7 days.

Ans: A

**Feedback:**

The neurotransmitters, which control the opening of ion channels, have a reaction time of milliseconds.

10. A client with a history of an endocrine disorder exhibits signs and symptoms of hormone deficiency. Which of the following processes would the client's care team most likely rule out first as a contributing factor?
- A) The client's target cells lack sufficient receptors for the hormone in question.
  - B) Hormone production is sufficient, but affinity on the part of the target cells is lacking.
  - C) The process of down-regulation has resulted in decreased hormone sensitivity.
  - D) Up-regulation has increased the sensitivity of the body to particular hormone levels.

Ans: D

**Feedback:**

Up-regulation is a response to low hormone levels in which the number of receptors increases. As such, it would not likely result in signs and symptoms of deficiency but is rather a compensatory mechanism that counters a deficiency. Insufficient numbers of receptors, low affinity, and down-regulation could all contribute to signs and symptoms of a hormone deficiency.

11. Which of the following statements best captures the essence of a second messenger in the mechanisms of the endocrine system?
- A) Second messengers act as the intracellular signal that responds to the presence of a hormone.
  - B) Endocrine-producing cells must release both a hormone and a second messenger in order to exert a distant effect.
  - C) Second messengers act to supplement hormone effects on cell receptors when the desired hormonal effect must be either increased.
  - D) Second messengers provide an alternative pathway for endocrine effects on a cell that bypass the normal receptor pathways.

Ans: A

**Feedback:**

Second messengers interact with hormones that cannot cross the cell membrane, and they mediate the ultimate effect on the cell. They are not produced by the hormone-producing cell, and they are necessary to bring about hormonal effects, not simply for increasing the intensity of the effect. They are not an alternative mechanism of effect but rather a prerequisite for certain hormonal effects on body cells.

12. A client with a new diagnosis of an endocrine disorder is unclear how the body can control the levels of different hormones over time. Which of the following statements most accurately underlies the dominant regulation process of hormone levels in the body?
- A) A positive feedback cycle ensures that stable levels of hormones exist in the body over time.
  - B) With input from various sensors, hormone production and release are adjusted based on existing hormone levels.
  - C) The hypothalamus ensures that hormone levels correspond accurately to the diurnal cycle.
  - D) The pituitary gland is genetically programmed to stimulate and inhibit hormone production and/or release based on the needs at different points in the life cycle.

Ans: B

**Feedback:**

Most hormone levels are controlled by way of a negative feedback cycle, in which low levels stimulate production and/or release. A positive feedback cycle would not achieve this effect. While some hormones are released on a diurnal schedule, the dominant form of hormone regulation in the body is that of negative feedback. Hormone release is not predetermined by the pituitary gland.

13. A 21-year-old female is suspected of having inadequate function of her hypothalamic–pituitary–thyroid system. Her care provider is planning to inject thyrotropin-releasing hormone (TRH) and then measure her levels of TSH. Which of the following diagnostic tests is being performed?

A) Suppression test  
B) Radioimmunoassay (RIA) test  
C) Stimulation test  
D) Metabolite excretion test

Ans: C

**Feedback:**

A stimulation test involves the introduction of an element that stimulates the production of another factor or hormone followed by measurement of that hormone. This is not the case in a suppression test, RIA test, or metabolite excretion test.

14. Following a meal, a woman's blood glucose level has increased. In addition, her pancreas has increased the amount of insulin produced and released. Which of the following phenomena has occurred?

A) Increased hormone level according to a negative feedback mechanism  
B) Adjustment according to the level of the substance a hormone regulates  
C) Hormone production and release via the positive feedback cycle  
D) Hypothalamic–pituitary control of hormone levels

Ans: B

**Feedback:**

The level of some hormones is adjusted according to the amount of the substance that they control. In this case, insulin controls glucose levels and would increase in response to the increase in serum glucose that follows a meal. This differs from a negative feedback cycle in which a simple decrease in a hormone level stimulates production and/or release of that hormone. Positive feedback and hypothalamic–pituitary control are not evident in this situation.

15. Which of the following statements best captures the relationship between the hypothalamus and the pituitary gland as it relates to endocrine function?
- A) The hypothalamus directly measures the levels of most hormones throughout the body and inhibits or stimulates the pituitary accordingly.
  - B) The pituitary gland coordinates and dictates the release of hormones from the hypothalamus that act on their intended target cells.
  - C) The pituitary gland and hypothalamus have two-way communication that mediates the signals from neuronal inputs.
  - D) The hypothalamus receives input from numerous sources throughout the body and directs the pituitary to then control many target glands and cells.

Ans: D

**Feedback:**

The hypothalamus can be viewed as a bridge by which signals from multiple systems are relayed to the pituitary gland. The hypothalamus collects data from sources throughout the body rather than directly measuring levels, and communication normally flows from the hypothalamus to the pituitary.

16. A 38-year-old woman takes clomiphene, an infertility drug that works by competing with, and thereby blocking, cellular receptors for estrogen. Which of the following statements is most likely to be true of this client?
- A) Receptors for all other steroid hormones will also be blocked.
  - B) Up-regulation will increase the number of estrogen receptors on each target cell.
  - C) Estrogen will continue to pass freely through the cellular membranes.
  - D) Laboratory tests will reveal an increase in cyclic adenosine monophosphate (cAMP) levels.

Ans: C

**Feedback:**

Because estrogen is a steroid hormone, its receptors in target cells are located inside the cell membrane, and their blockage does not affect the movement of the hormone into and out of the cell. Receptors are specific for each hormone, so no hormones other than estrogen will be blocked. Up-regulation occurs when hormone levels are decreased, and in this case, the estrogen level will increase. Second messengers, such as cAMP, are only activated by peptide hormones and catecholamines.

17. During the follicular stage of menstruation, increased estradiol production causes an increase in FSH production. This increase in FSH production by the anterior pituitary gland will have what effect on the follicle?
- A) The follicle will continue to grow until it can no longer stay in its membrane.
  - B) The follicle will die, which results in a fall of FSH.
  - C) The follicle will continue to grow and produce estradiol.
  - D) The follicle will secrete additional hormones to attract swimming sperm.

Ans: B

**Feedback:**

In positive feedback control, rising levels of a hormone cause another gland to release a hormone that is stimulating to the first. Increased estradiol production during the follicular stage of the menstrual cycle causes increased FSH production by the anterior pituitary gland. This stimulates further increases in estradiol levels until the demise of the follicle.

18. A middle-aged woman has acromegaly as a result of a pituitary adenoma that was found and removed when she was a teenager. The physician is suspecting that the tumor has returned and has ordered a diagnostic work-up. A glucose load is ordered. If the tumor has returned, the nurse would expect which of the following results?
- A) The glucose load will suppress GH level.
  - B) The growth hormone level will not be suppressed following glucose load.
  - C) The glucose load will raise her serum glucose level to the point of requiring insulin.
  - D) There will be no change in the serum growth hormone level following the glucose load.

Ans: B

**Feedback:**

When a GH-secreting tumor is suspected, the GH response to a glucose load is measured as part of the diagnostic workup. Normally, a glucose load would suppress GH levels. However, in adults with GH-secreting tumors (acromegaly), GH levels are not suppressed (and paradoxically increase in 50% of cases) to a glucose load.

19. A patient exhibiting problems with his or her thyroid has been scheduled for a radioactive scan. From the following list of patients, what would the nurse question as to whether this would be a safe procedure for this patient?
- A) An adult patient having an episode of wheezing from allergies
  - B) A young female patient who has been trying to get pregnant
  - C) A middle-aged male patient with uncontrolled type 2 diabetes mellitus
  - D) An elderly patient who has a history of aortic stenosis

Ans: B

**Feedback:**

Radioactive iodine therapy is contraindicated in pregnant women because  $^{131}\text{I}$  crosses the placenta and can adversely affect the fetal thyroid gland. The other clients would have no contraindication to the substance.

20. A 48-year-old woman has been found to have nodules on her thyroid that must be biopsied to determine whether or not they are malignant. Which of the following imaging techniques will be most helpful to the surgeon in visualization of the nodes for fine needle aspiration?
- A) Ultrasound
  - B) Magnetic resonance imaging
  - C) Radioactive scanning using radioiodine
  - D) Radioactive scanning using sestamibi

Ans: A

**Feedback:**

Thyroid ultrasound is recommended for managing thyroid nodules and can aid in visualization of the nodule for biopsy (fine needle aspiration [FNA]), which is necessary to help distinguish benign from malignant etiology. Magnetic resonance imaging is the preferred choice for pituitary and hypothalamic imaging. Isotopic imaging includes radioactive scanning of the thyroid (*e.g.*, using radioiodine), parathyroids (*e.g.*, using sestamibi), and adrenals (*e.g.*, using metaiodobenzylguanidine [MIBG] to detect pheochromocytoma).



## Chapter 41- Disorders of Endocrine Control of Growth and Metabolism

1. A female patient presented to her primary care physician with classic signs and symptoms of Cushing syndrome. Upon testing, it was discovered that the patient had vaginal small cell carcinoma. How can the health care providers explain her Cushing syndrome signs and symptoms to this patient?
  - A) "Your tumor in your vagina is secreting a hormone called adrenocorticotrophic hormone (ACTH), which is responsible for these signs and symptoms."
  - B) "We are going to have to run some more tests. We think you might have a problem with your pituitary gland."
  - C) "There is no connection between the Cushing syndrome and the vaginal carcinoma. You have two very distinct problems occurring at the same time."
  - D) "We need to check your thyroid. Your Cushing syndrome may be caused by hypofunction of this gland."

Ans: A

**Feedback:**

Hyperfunction is usually associated with excessive hormone production. This can result from excessive stimulation and hyperplasia of the endocrine gland or from a hormone-producing tumor. A clinical example of this phenomenon is evidenced by the case of a woman with vaginal small cell carcinoma who also presented with Cushing syndrome. After testing, it was determined that the tumor is secreting ACTH. In this situation, the cause is not related to a pituitary problem. There is a connection between Cushing syndrome and the carcinoma. The thyroid gland is not responsible for Cushing syndrome.

2. Following destruction of the pituitary gland, ACTH stimulation stops. Without ACTH to stimulate the adrenal glands, the adrenals' production of cortisol drops. This is an example of which type of endocrine disorder?
  - A) Primary
  - B) Secondary
  - C) Tertiary
  - D) Somatic

Ans: B

**Feedback:**

In secondary disorders of endocrine function, the target gland is essentially normal, but defective levels of stimulating hormones or releasing factors from the pituitary system alter its function.

3. Following a long history of fatigue, weakness, and poor appetite, a 39-year-old male has been diagnosed with hypopituitarism. Which of the following clinical findings would most likely cause his care team to suspect that the man has an additional endocrine disorder from a different source?

A) The man has a low sperm count and has been unable to have children.  
B) The man has a chronic platelet deficiency and is occasionally anemic.  
C) The client is 5'2" tall and was consistently short for his age as a child.  
D) The man displays the signs and symptoms of hypothyroidism.

Ans: B

**Feedback:**

Low platelets and low hemoglobin are unlikely to be a manifestation of hypopituitarism. A low sperm count, small stature, and hypothyroidism are all noted manifestations of pituitary hypofunction.

4. Growth hormone (GH) secretion is inhibited by

A) hypoglycemia.  
B) starvation.  
C) heavy exercise.  
D) obesity.

Ans: D

**Feedback:**

GH is inhibited by increased glucose levels, free fatty acid release, cortisol, and obesity. It is stimulated by hypoglycemia, fasting starvation, increased blood levels of amino acids, and stress conditions such as trauma, excitement, emotional stress, and heavy exercise.

5. Testing for short stature growth hormone (GH) problems can be done by pharmacologic means. Which of the following medications can be utilized to test for a rise in GH?

Select all that apply.

A) Insulin  
B) Levodopa  
C) Persantine  
D) Dobutamine  
E) Sestamibi

Ans: A, B

**Feedback:**

Diagnostic procedures for short stature include tests to exclude nonendocrine causes. If the cause is hormonal, extensive hormonal testing procedures are initiated. Tests can be performed using insulin, CHRH, levodopa, and arginine, all of which stimulate GH secretion so that GH reserve can be evaluated. Persantine, dobutamine, and sestamibi are used in cardiac stress testing. Sestamibi is also used in the testing of the parathyroid.

6. The mother of 6-year-old male and female fraternal twins has brought her son to see a pediatrician because he is nearly 4 inches shorter than his sister. Which of the following phenomena would the physician most likely suspect as contributing factor to the boy's short stature?
- A) Genetic short stature
  - B) Lack of IGF receptors in epiphyseal long bones
  - C) A shortage of hypothalamic GHRH production
  - D) Excess insulin production resulting in chronically low blood glucose levels

Ans: C

**Feedback:**

Inadequate levels of hypothalamic GHRH will result in adequate production but inadequate release of GH by the pituitary. Genetic short stature is less likely given the disparity between his height and his twin's, and a shortage of IGF receptors is not a noted pathology. While poorly controlled diabetes can contribute to short stature, excess insulin production is not a likely factor.

7. A 28-year-old male who is 6'11" tall has a diagnosis of acromegaly. The man is explaining to a curious but sympathetic coworker exactly what accounts for his extraordinary height. Which of the following explanations demonstrates a sound understanding of his health problem?
- A) "My pituitary gland produced a much higher than normal amount of growth hormone when I was a child."
  - B) "A tumor in my brain threw off my hormone levels after I was finished adolescence."
  - C) "My liver is malfunctioning and produces too many of the hormones that ultimately cause growth."
  - D) "The high sugar levels that go along with my diabetes made my pituitary gland overproduce the hormones that cause you to grow."

Ans: B

**Feedback:**

Acromegaly is associated with adult onset and nearly always involves an adenoma. Increased GH as a child and liver dysfunction are not noted contributors to acromegaly. High levels of GH can cause overproduction of insulin and eventual diabetes, but diabetes does not itself lead to acromegaly.

8. An endocrinologist is providing care for a 30-year-old male who has lived with the effects of increased levels of growth hormone (GH). Which of the following teaching points about the client's future health risks is most accurate?
- A) "It's not unusual for high GH levels to cause damage to your hypothalamus."
  - B) "GH excess inhibits your pancreas from producing enough insulin."
  - C) "The high levels of GH that circulate in your body can result in damage to your liver."
  - D) "When your pituitary gland is enlarged, there's a real risk that you'll develop some sight deficiencies."

Ans: D

**Feedback:**

GH excess is associated with tumor formation and consequent compression of cranial nerves responsible for vision. Damage to the hypothalamus and liver is not common sequelae. While the beta cells of the pancreas can "burn out," the primary effect of excess GH is to increase insulin secretion.

9. Of the following patient conditions, which patients would be at risk for experiencing a thyroid problem due to a decrease in thyroxine-binding globulin (TBG)? Select all that apply.
- A) A 55-year-old male with cirrhosis due to alcohol abuse
  - B) A 47-year-old female experiencing hot flashes and excess diaphoresis related to menopause
  - C) A 75-year-old man receiving chronic glucocorticoid therapy to treat his severe chronic obstructive pulmonary disease (COPD)
  - D) A 18-year-old female anorexia nervosa patient weighing 78 lb and has consumed no protein for the past 3 years

Ans: A, C, D

**Feedback:**

A number of disease conditions and pharmacologic agents can decrease the amount of binding protein in the plasma or influence the binding of hormone. Glucocorticoid medications and systemic disease conditions such as protein malnutrition, nephritic syndrome, and cirrhosis decrease TBG concentrations.

10. An infant born with congenital hypothyroidism and has not sought care from any health care provider is likely to develop which of the following complications? Select all that apply.

- A) Deformed joints and bone spurs
- B) Impaired physical growth
- C) Mental retardation
- D) Loss of fine motor control and arthritis
- E) Down syndrome

Ans: B, C

**Feedback:**

Thyroid hormone is essential for normal growth and brain development, almost half of which occurs during the first 6 months of life. If untreated, congenital hypothyroidism causes mental retardation and impairs physical growth. Down syndrome is a congenital birth defect and not caused by hypothyroidism.

11. Following the identification of low levels of T3 and T4 coupled with the presence of a goiter, a 28-year-old female has been diagnosed with Hashimoto thyroiditis. In light of this diagnosis, which of the following assessment results would constitute an unexpected finding?

- A) The presence of myxedema in the woman's face and extremities
- B) Recent weight gain despite a loss of appetite and chronic fatigue
- C) Coarse, dry skin and hair with decreased sweat production
- D) Increased white cell count and audible crackles on chest auscultation

Ans: D

**Feedback:**

An increased white cell count and the presence of adventitious fluid in the lungs are not classic findings associated with hypothyroidism. Myxedema, weight gain, lethargy, and dry skin and nails are commonly associated with low levels of thyroid hormones.

12. Of the following list of nursing interventions, which would be considered priority when managing a patient with life-threatening myxedematous coma? Select all that apply.
- A) Administer 3% sodium IV solution to increase sodium levels.
  - B) Administer 50% dextrose to raise glucose levels.
  - C) Place on oxygen therapy to encourage deep breathing.
  - D) Place on a warming bed to raise body temperature.
  - E) Administer sedatives frequently to prevent seizures.

Ans: A, B, C

**Feedback:**

Myxedematous coma is a life-threatening, end-stage expression of hypothyroidism. It is characterized by coma, hypothermia, CV collapse, hypoventilation, and severe metabolic disorders that include low sodium, low glucose, and lactic acidosis. Treatment includes aggressive management of precipitating factors; supportive therapy such as management of CV status, hyponatremia, and hypoglycemia; and thyroid replacement therapy. If hypothermia is present, active rewarming is *contraindicated* because it may induce vasodilation and vascular collapse. Administering sedatives frequently could be harmful since the person is unable to metabolize sedatives, analgesics, and anesthetic drugs.

13. A nurse on a medical unit is providing care for a 37-year-old female patient who has a diagnosis of Graves disease. Which of the following treatments would the nurse most likely anticipate providing for the client?
- A)  $\beta$ -Adrenergic-blocking medications to reduce sympathetic nervous stimulation
  - B) Administration of levothyroxine to supplement thyroid function
  - C) Calcium channel blocking medications to reduce heart rate and cardiac risks
  - D) Administration of somatostatin analogs to inhibit GH production

Ans: A

**Feedback:**

The hyperthyroidism that constitutes Graves disease can often be mitigated by the administration of  $\beta$ -adrenergic-blocking medications. Levothyroxine would be used to address hypothyroidism, and calcium channel blockers are not an identified treatment modality for Graves disease. Somatostatin analogs are used to treat GH excess.

14. After receiving change-of-shift report about the following four patients, which patient should the nurse assess first?
- A) A 22-year-old admitted with SIADH who has a serum sodium level of 130 mEq/L
  - B) A 31-year-old who has iatrogenic Cushing syndrome with a capillary blood glucose level of 204 mg/dL
  - C) A 53-year-old who has Addison disease and is due for a scheduled dose of hydrocortisone (Solu-Cortef)
  - D) A 70-year-old returning from PACU following partial thyroidectomy who is extremely agitated, has an irregular pulse rate of 134, and has an elevated temperature of 103.2°F

Ans: D

**Feedback:**

Manipulation of a hyperactive thyroid gland during thyroidectomy can cause thyroid storm. It is manifested by very high fever, extreme cardiovascular effects (tachycardia, HF, angina), and severe CNS effects (agitation, restlessness, and delirium). Answer choice A refers to normal sodium levels. Answer choice B refers to high blood glucose level but not critical level. Answer choice C refers to lower priority. It is always preferred to give medications in a timely manner; however, thyroid storm signs and symptoms are the priority for this group of patients.

15. Which of the following statements best captures the role of the adrenal cortex in maintaining homeostasis?
- A) The adrenal cortex is responsible for the production of epinephrine and norepinephrine that are part of the sympathetic nervous system.
  - B) The adrenal cortical hormones are primarily steroids and sex hormones.
  - C) Redundant, secondary production of adrenal cortical hormones can compensate for the loss of the adrenal glands.
  - D) Normal sexual function is dependent on adequate adrenal cortical function.

Ans: B

**Feedback:**

The adrenal cortex is responsible for secreting three types of hormones: the glucocorticoids, the mineralocorticoids, and the adrenal androgens. The adrenal medulla produces epinephrine and norepinephrine, and there are no alternate production sites for adrenal cortical hormones. The adrenal androgens are least responsible for normal sexual function.

16. Following the identification of low blood levels of cortisol and low 24-hour urinary free cortisol, a 51-year-old female client has been diagnosed with a primary adrenal cortical insufficiency. Which of the following health consequences would be attributable to her low levels of cortisol?

- A) Visible exophthalmos
- B) Impaired immunological and inflammatory response
- C) Diminished secondary sex characteristics
- D) Insufficient regulation of serum potassium and sodium levels

Ans: B

**Feedback:**

Cortisol plays a central role in the normal functioning of the immune response and inflammation. Exophthalmos is associated with Graves disease, and secondary sex characteristics are functions of adrenal androgens. Potassium and sodium are regulated by mineralocorticoids.

17. Which of the following statements best captures an aspect of the function of the hypothalamic–pituitary–adrenal (HPA) system?
- A) Adrenocorticotrophic hormone (ACTH) released by the hypothalamus controls to release of cortisol.
  - B) The pituitary gland communicates with the adrenal cortex through the release of ACTH.
  - C) The adrenal cortex receives corticotrophin-releasing hormone (CRH) and in turn releases cortisol.
  - D) The pituitary gland causes a release of CRH from the hypothalamus, which promotes hormone release from the adrenal cortex.

Ans: B

**Feedback:**

ACTH mediates between the anterior pituitary gland and the adrenal cortex in the HPA system. ACTH is released by the pituitary, not the hypothalamus, and CRH acts on the pituitary, not the adrenal cortex. CRH flows from the hypothalamus to the pituitary, not vice versa.



18. A 38-year-old male has presented to a clinic for the treatment of severe dermatitis after contact with poison ivy on a camping trip. The client has been prescribed prednisone, a corticosteroid, for the treatment of his skin condition. The client's care provider has emphasized that dosages of the drug will be gradually tapered off rather than stopped upon resolution of the symptoms. What is the most accurate rationale for this dosing protocol?
- A) The client's hypothalamic–pituitary–adrenal (HPA) system will require recovery time before normal function is restored.
  - B) Steroids can induce a dependency that is best addressed with a gradual withdrawal.
  - C) HPA function is heightened during steroid administration and must return to normal levels before the drug is completely stopped.
  - D) Abrupt cessation of the drug can contribute to symptoms similar to Cushing syndrome.

Ans: A

**Feedback:**

The suppression of the HPA system that accompanies steroid therapy requires time for a return to normal function. Dependency on the drug itself is not the rationale for tapering, and HPA function is suppressed, not heightened during therapy. Abrupt cessation can contribute to an Addison disease–like response, not Cushing syndrome.

19. A patient is admitted to the hospital in adrenal crisis 1 month after a diagnosis of Addison disease. The nurse knows which of the following clinical manifestations would support this diagnosis?

A) Hyperactive deep tendon reflexes and slow, shallow breathing  
B) Cerebral spinal fluid leakage and impaired swallowing  
C) Irregular heart rate and decreased temperature  
D) Change in the level of consciousness and profound hypotension

Ans: D

**Feedback:**

Acute adrenal crisis is a life-threatening situation. Exposure to even a minor illness or stress can cause a client with Addison disease to develop nausea, vomiting, muscular weakness, hypotension, dehydration, and vascular collapse (which causes a change in LOC). Hemorrhage (low BP) can be caused by septicemia, adrenal trauma, anticoagulant therapy, adrenal vein thrombosis, or adrenal metastases. A hyperactive reflex may indicate disease of the pyramidal tract above the level of the reflex arc being tested. Generalized hyperactivity of DTRs may be caused by hyperthyroidism. Any tear or hole in the membrane that surrounds the brain and spinal cord (dura) can allow the fluid that surrounds those organs to leak. This fluid is called the cerebrospinal fluid (CSF). When it leaks out, the pressure around the brain and spinal cord drops. Causes of leakage through the dura include certain head, brain, or spinal surgeries; head injury; placement of tubes for epidural anesthesia or pain medications; or lumbar puncture. Irregular heart rates (arrhythmias) may be caused by many different factors, including coronary artery disease; electrolyte imbalances in your blood (such as sodium or potassium); changes in your heart muscle; or injury from a heart attack.

20. A 51-year-old woman has been diagnosed with Cushing syndrome after a diagnostic workup that reveals cortisol hypersecretion. The nurse knows which of the following assessment findings would be inconsistent with her diagnosis?

A) Increased blood pressure and decreased potassium levels  
B) A protruding abdomen and a "buffalo hump" on the back  
C) Poor stress management and hyperpigmentation  
D) A "moon face" and muscle weakness

Ans: C

**Feedback:**

A low tolerance for stress and hyperpigmentation is associated with Addison disease and its consequent elevated levels of ACTH. High blood pressure, hypokalemia, buffalo hump, and moon face are all characteristics of the elevated steroid levels that denote Cushing syndrome.

## Chapter 42 - Structure and Function of the Male Genitourinary System

1. A couple who have three daughters would like to add a son to their family, and they have recently learned that the woman is pregnant. Which of the following phenomena would most likely be associated with the woman's eventual delivery of a healthy son?
  - A) The production of dihydrotestosterone (DHT) by the embryo and DHT's differentiation into testosterone
  - B) Development of testes under the influence of the X chromosome
  - C) Suppression of female reproductive structures by anti-Müllerian hormone (AMH)
  - D) Atrophy of the Wolffian ducts during embryonic development

Ans: C

**Feedback:**

AMH suppresses the development of female genital structures and is a normal aspect of normal sex differentiation. Testosterone is a precursor to DHT rather than vice versa, and testes develop under the influence of the Y chromosome. The Wolffian ducts are a component of male sex differentiation.

2. The nurse knows that if which of the following hormones listed below are not available during embryonic development, a male embryo with an XY chromosomal pattern may develop female external genitalia? Select all that apply.
  - A) Anti-Müllerian hormone (AMH)
  - B) Testosterone
  - C) Dihydrotestosterone (DHT)
  - D) Acrosome
  - E) Follicle-stimulating hormone (FSH)

Ans: B, C

**Feedback:**

In the absence of testosterone (and DHT), a male embryo with an XY chromosomal pattern develops female external genitalia. AMH suppresses the Müllerian ducts and prevents development of the uterus and fallopian tubes in the male. Acrosome is the outside of the anterior two thirds of the head of a sperm. For spermatogenesis to occur, FSH binds to specific receptors in Sertoli cells.

3. A 68-year-old male has visited his family physician because the size of his scrotum has increased exponentially in recent months. He has subsequently been diagnosed with an inguinal hernia. Which of the following statements best captures the nature of his health problem?

- A) Part of his intestine and parietal peritoneum are protruding through the inguinal opening.
- B) Rupture of the tunica vaginalis has allowed a part of his small bowel to protrude into the intrascrotal space.
- C) Incomplete closure of the inguinal opening during his development has contributed to testicular hypertrophy and hyperplasia.
- D) Occlusion of the efferent ductules and epididymis causes massive dilation of the testes.

Ans: A

**Feedback:**

An inguinal hernia is the protrusion of intestine and peritoneum into the scrotum through an incompletely sealed inguinal opening. The tunica vaginalis, occlusion of the duct system, nor testicular hypertrophy and hyperplasia contribute to the etiology.

4. The cremaster muscles work in concert with the pampiniform plexus that surrounds the testicular artery to

- A) move the testes into the scrotum.
- B) maintain testicular temperature.
- C) empty fluid from the seminal vesicles into the genital ducts.
- D) move sperm from the ampulla to the penis.

Ans: B

**Feedback:**

The location of the testes in the scrotum is important for sperm production, which is optimal at 2°C to 3°C below body temperature. Two systems maintain the temperature of the testes at a level consistent with sperm production. One is the pampiniform plexus of testicular veins that surround the testicular artery. This plexus absorbs heat from the arterial blood, cooling it as it enters the testes. The other is the cremaster muscles. These muscles respond to decreases in testicular temperature by moving the testes closer to the body.

5. A couple has been trying to get pregnant for over 2 years. After infertility testing, the physician has informed the male that he has a low sperm count. The nurse knows which of the following causes of low sperm count may lead to impaired spermatogenesis? Select all that apply.

A) Prolonged fever  
B) Wearing tight briefs rather than boxers  
C) Undescended testes  
D) Swimming in cold-water lakes  
E) Vacationing in a tropical location

Ans: A, B, C

**Feedback:**

Prolonged exposure to elevated temperatures, as a result of prolonged fever, tight undergarments, and failure of the testes to descend into the scrotum can result in decreased sperm counts.

6. Following ejaculation in a healthy adult, approximately 300 million sperm is present. Which percent of these sperm would be considered normal (mobile and morphologically healthy) and able to fertilize an egg?

A) 95%  
B) 75%  
C) 55%  
D) 45%

Ans: C

**Feedback:**

Approximately 3 mL of semen is expressed with each ejaculate, and each milliliter is made up of about 100 million sperm. However, approximately 20% of the sperm in any ejaculate are not morphologically normal and about 25% are immobile.

7. A nursing student studying obstetrics asks the faculty, "How does the sperm get so much energy to swim up the fallopian tubes?" The instructor responds based on which pathophysiological principle?
- A) Usually the ejaculation is so powerful that it propels the sperm far up into the fallopian tubes.
  - B) Fructose is secreted by the seminal vesicles and provides energy for motility of the sperm.
  - C) The seminal vesicles secrete fluid for the semen, and they can secrete catecholamines that energize the sperm.
  - D) Estrogen, which is being secreted when the ova are ripe and ready for penetration, assists by attracting the sperm in the right direction.

Ans: B

**Feedback:**

The seminal vesicles consist of two highly tortuous tubes that secrete fluid for the semen. Each of the paired seminal vesicles is lined with secretory epithelium containing an abundance of fructose, prostaglandins, and several other proteins. The fructose secreted by the seminal vesicles provides the energy for sperm motility.

8. Sperm follow a prescribed route through the excretory ducts of the male reproductive system. Place the following components of the genital duct system in the order that sperm follow. Use all the options.
- A) Efferent ductules
  - B) Ductus deferens
  - C) Prostatic urethra
  - D) Urethra
  - E) Seminiferous tubules
  - F) Epididymis

Ans: E, A, F, B, C, D

**Feedback:**

Seminiferous tubules combine in the testes to form the rete testes, which flow into the efferent ductules and the epididymis. The epididymis flows into the ductus deferens, which leaves the testes passing through the prostatic urethra before leaving the body by way of the urethra.

9. An elderly male patient is complaining of dribbling after he urinates and feeling like he never empties his bladder. The nurse suspects the patient may have a problem with
- A) kidney stones.
  - B) an enlarged prostate gland.
  - C) blood clots clogging the urethra.
  - D) calcium sediment in the bladder.

Ans: B

**Feedback:**

Symptoms of obstruction, including dribbling after urinating and the continuous sensation of having to urinate, are most likely due to enlargement of a prostate gland. Kidney stones cause intense flank pain; blood clots are usually associated with trauma or surgery; calcium sediment could imply a kidney stone or be a result of a procedure to break up kidney stones into smaller segments.

10. Which of the following statements best captures an aspect of normal spermatogenesis?
- A) Testosterone chemically lyses each primary spermatocyte into two secondary spermatocytes with 23 chromosomes each.
  - B) Sertoli cells differentiate into spermatids, each of which can contribute half of the chromosomes necessary for reproduction.
  - C) Spermatogonia adjacent to the tubular wall undergo meiotic division and provide a continuous source of new germinal cells.
  - D) Each primary spermatocyte undergoes two nuclear divisions yielding four cells with 23 chromosomes each.

Ans: D

**Feedback:**

The process of meiosis consists of two consecutive nuclear divisions of a primary spermatocyte with formation of four daughter cells, each containing a single set of 23 chromosomes. Testosterone does not chemically lyse immature sperm, and Sertoli cells play a nurturing and facilitative role in spermatogenesis rather than differentiating themselves into spermatocytes. Spermatogonia undergo mitosis, not meiosis.

11. A student asks the instructor what are the parameters of infertility. The instructor responds, "Infertility is defined as"
- A) 100 million of sperm in ejaculate.
  - B) 50% of sperm has good motility.
  - C) morphology that appears normal.
  - D) 10 million/mL sperm available in seminal fluid.

Ans: D

**Feedback:**

The sperm count in a normal ejaculate is approximately 100 to 400 million. Infertility may occur when insufficient numbers of motile, healthy sperm are present. A "fertile sample" on seminal fluid analysis is associated with a count greater than 20 million/mL, greater than 50% motility, normal morphology, and a volume of 1.5 to 6 mL.

12. A 40-year-old male client with multiple health problems has been diagnosed with a testosterone deficiency. The nurse knows that which of the following assessment findings would correlate with a testosterone deficiency? Select all that apply.

- A) A high-pitched voice
- B) Long-lasting chronic hip dysplasia
- C) Complaints of multiple upper respiratory infections
- D) A low muscle mass in proportion to his total body weight
- E) Hot flashes and diaphoresis

Ans: A, D

**Feedback:**

Vulnerability to infection and hip dysplasia would likely not be a manifestation of low testosterone. Low muscle mass, hot flashes and diaphoresis, and a lack of male voice characteristics could develop secondary to testosterone deficiency.

13. A 31-year-old male has been referred to a fertility clinic following a count of 2 million sperm/mL on seminal fluid analysis. Which of the following hormone levels would a clinician want to examine in an effort to ascertain the cause of the client's low sperm count? Select all that apply.

- A) Luteinizing hormone (LH)
- B) Adrenocorticotrophic hormone (ACTH)
- C) Follicle-stimulating hormone (FSH)
- D) Cortisol
- E) Somatostatin
- F) Gonadotropin-releasing hormone (GnRH)

Ans: A, C, F

**Feedback:**

LH, FSH, and GnRH are all components of the hypothalamic–pituitary control of spermatogenesis. ACTH, cortisol, and somatostatin are not directly involved in the process.



14. A 39-year-old male client has been recently diagnosed with primary hypogonadism. Which of the following lab results would be most indicative of this diagnosis?

- A) Normal levels of free testosterone; low levels of total testosterone
- B) Low free testosterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH) levels
- C) Low levels of gonadotropin-releasing hormone (GnRH)
- D) Low testosterone levels; high levels of LH and FSH

Ans: D

**Feedback:**

Primary hypogonadism is associated with a defect in the testicular production of testosterone normally accompanied by high levels of the hormonal precursors. Free testosterone levels would not be normal given the client's diagnosis. Low GnRH levels are associated with tertiary hypogonadism.

15. Which of the following statements best captures an aspect of the neural control of sexual function?

- A) The sensory system contained in the testes communicates with the spinal cord by way of afferent pathways.
- B) Perineal stimulation transmits signals to the thalamus and hypothalamus.
- C) The spinal cord plays a central role, with the limbic system and cerebral cortex also contributing.
- D) Sympathetic stimulation causes the shunting of blood resulting in erection, while parasympathetic stimulation results in detumescence.

Ans: C

**Feedback:**

Afferent impulses from sensory receptors in the glans penis pass through the pudendal nerve to ascending fibers in the spinal cord by way of the sacral plexus, while stimulation of other perineal areas can transmit signals to higher brain centers, such as the limbic system and cerebral cortex. The thalamus and hypothalamus do not play a central role in the neural control of male sexual function, and arousal can result from parasympathetic stimulation.

16. A 24-year-old male patient with a complete transection of the spinal cord asks, "Will I be able to father children in the future?" The nurse responds,
- A) "Probably not since your spinal cord has been completely severed."
  - B) "An urologist may be able to insert a needle into your testes and withdraw some sperm."
  - C) "With proper stimulation of your genitals, you may be able to produce an erection and ejaculation."
  - D) "It takes sympathetic innervation to produce an erection and ejaculation which is lost with your type of injury."

Ans: C

**Feedback:**

Genital stimulation can produce erection and ejaculation in some men with complete transection of the spinal cord; therefore, that negates answer choices A and D.

17. A 71-year-old man has visited his family physician for a checkup, during which the physician has initiated a discussion about the client's sexual function. Which of the following phenomena would the physician most likely consider pathological rather than age-related changes?
- A) The presence of an enlarging prostate gland
  - B) A decrease in the size and firmness of the client's testes
  - C) Cessation of androgen production
  - D) A decrease in the force of the man's ejaculation

Ans: C

**Feedback:**

Absence of androgen production and release would be considered a pathological finding rather than a normal accompaniment of the aging process. Androgen replacement in aging men with low androgen levels shows an increase in lean body mass and a decrease in bone turnover. Although they would not necessarily remain untreated, hypogonadism, testicular atrophy, and a decreased force of ejaculation are common reproductive changes that are associated with advanced age.

18. If a male has a history of impaired blood flow in his vascular system, he may be prone to develop

- A) premature ejaculation.
- B) erectile dysfunction.
- C) penile engorgement.
- D) vascular clots in pudendal arteries.

Ans: B

**Feedback:**

Vascular disease affects male potency because it may impair blood flow to the pudendal arteries or their tributaries, resulting in loss of blood volume with subsequent poor distention of the vascular spaces of erectile tissue. Premature ejaculation is not caused by a vascular problem. Penile engorgement is expected as part of an erection. Vascular clots may relate to a trauma or surgery to the penis.

19. A 68-year-old man has revealed to his care provider that he is distraught over his increasingly frequent inability to maintain an erection. Which of the following teaching points is most warranted?

- A) "Above the age of 65, erectile dysfunction is largely inevitable and untreatable."
- B) "With lifestyle modifications like exercise, weight loss, and quitting smoking, you can most likely correct this and prevent it in the future."
- C) "While this problem is often a part of the aging process, it might be a result of some of the medications that you take."
- D) "Most often this problem is transient and will resolve with time."

Ans: C

**Feedback:**

The incidence and prevalence of ED increase with age, and medications often contribute to the problem. ED is not inevitable or untreatable, but it is unlikely to spontaneously resolve. Lifestyle modifications can lessen the risk of developing ED but cannot guarantee correction or prevention.

20. A 21-year-old college football player has acknowledged to a nurse at a campus clinic that he has been injecting androgens in an effort to increase the size of his musculature and enhance his on-field performance. Which of the following teaching points should the nurse include in a conversation with the player?
- A) "You run a real risk of developing acne and developing breasts by doing this."
  - B) "You will indeed be able to increase your muscles, but they will rebound by shrinking smaller than they ever were within a few months."
  - C) "Most of the people who do this cause themselves to be permanently sterile."
  - D) "A reduction in the size of your penis and the production of mutated sperm can be an effect of steroid use."

Ans: A

**Feedback:**

Testicular atrophy and gynecomastia are identified as the effects of anabolic steroid use. Rebound muscle atrophy is not a noted phenomenon that accompanies the steroid use, nor is a permanent cessation of spermatogenesis. Changes in penis size and mutation in sperm cell divisions are similarly unlikely.

## Chapter 43- Disorders of the Male Reproductive System

1. A newborn male has been diagnosed with hypospadias following his postpartum assessment by a pediatrician. Which of the following diagnostics and treatment options is the physician most likely to rule out first?
  - A) Chromosomal studies
  - B) Circumcision
  - C) Surgical repair
  - D) Testosterone supplementation

Ans: B

**Feedback:**

Because the foreskin is often used in surgical repair of hypospadias, circumcision is normally contraindicated. Chromosomal studies are frequently warranted, and surgery is the standard treatment for the repair of the urethra. Testosterone supplementation is often necessary.

2. A 41-year-old male has presented to his family physician stating that for the last 2 years his erection "is as crooked as a dog's hind leg and hurts too." He has subsequently been diagnosed with Peyronie disease. Which of the following statements by his physician is most appropriate?
  - A) "Even though it's obviously distressing, you should know that this will likely resolve on its own with time."
  - B) "I'll refer you to a urologist who will likely want to perform a circumcision."
  - C) "This might need surgery, but it could possibly disappear over time without needing treatment."
  - D) "There are things you can do to minimize this, such as getting more exercise, stopping smoking, and maintaining a healthy diet."

Ans: C

**Feedback:**

While spontaneous resolution is possible, surgery is sometimes necessary for the treatment of Peyronie disease. Circumcision would not be an effective treatment, and lifestyle factors are not noted to contribute to the etiology or resolution.

3. A 66-year-old man has presented to a nurse practitioner to get a refill for his antiplatelet medication. The client has a history of ischemic heart disease and suffered a myocardial infarction 5 years ago and has unstable angina; he uses a transdermal nitroglycerin patch to control his angina. The client has a 40 pack-year smoking history and uses nebulized bronchodilators at home for the treatment of transient shortness of breath. He has long-standing hypertension that is treated with a potassium-sparing diuretic and a  $\beta$ -adrenergic-blocking medication. During the nurse's assessment, the man states that he has been unable to maintain his erection in recent months. Which of the following aspects of the man's health problems and treatments would the nurse identify as contributing to his erectile difficulty (ED)? Select all that apply. His
- A) antihypertensive medications.
  - B) use of bronchodilators.
  - C) hypertension.
  - D) diuretic use.
  - E) smoking history.
  - F) age.

Ans: A, C, E, F

**Feedback:**

Hypertension, antihypertensive medications, age, and smoking are all implicated in the etiology of ED. Ischemic heart disease and bronchodilators are less likely to directly contribute to the condition.

4. A 54-year-old diabetic patient has come to the urology clinic complaining of erectile dysfunction. His history includes obesity, coronary artery disease that required CABG 3 years ago, hypertension, and gout. The nurse practitioner is reviewing his record in order to prescribe medication. The practitioner is considering prescribing sildenafil (Viagra). Which of the following home medications is contraindicated if taken concurrently with sildenafil?
- A) Diltiazem (Cardizem), a calcium channel blocker
  - B) Cordarone (amiodarone), an antiarrhythmic
  - C) Imdur (isosorbide mononitrate), a vasodilator
  - D) Lasix (furosemide), a diuretic

Ans: C

**Feedback:**

Sildenafil (Viagra) is a selective inhibitor of phosphodiesterase type 5 (PDE-5), the enzyme that inactivates cGMP. This acts by facilitating corporeal smooth muscle relaxation in response to sexual stimulation. The concomitant use of PDE-5 inhibitors and nitrates (Imdur) is absolutely contraindicated because of the risk of profound hypotension. The other medications listed are not nitrates and do not have this adverse reaction.

5. Two nursing students are debating the merits and demerits of infant circumcision. Which of the following statements is most accurate?
- A) "Circumcised men tend to have a lower incidence of penile cancer."
  - B) "Getting circumcised basically rules out the possibility of getting Peyronie disease later in life."
  - C) "Circumcision reduces pressure on the deep dorsal vein and the dorsal artery, making erection easier later in life."
  - D) "The odds of getting infant priapism fall with circumcision."

Ans: A

**Feedback:**

A correlation between circumcision and lower incidence of penile cancer has been noted. Circumcision is unlikely to affect the development of Peyronie disease or priapism, and is not noted to influence the ease of attaining or maintaining erection.

6. A care aide at a long-term care facility has left a note for the care director stating that an 82-year-old resident has a grossly distended scrotum and a likely inguinal hernia. On examination, the resident has been diagnosed instead with hydrocele. What will the care team most likely tell the resident and his family about his diagnosis?
- A) "We'll get you to the hospital quickly, because if this isn't treated, it can result in a blockage in the blood flow to your testes."
  - B) "This isn't a result of your intestine entering your scrotum, but an accumulation of fluid within your testes."
  - C) "This can sometimes result from the lower level of sex hormones that comes with age, so you will likely benefit from a testosterone supplement."
  - D) "While distressing to look at, this condition usually doesn't have any significant consequences and won't need treatment."

Ans: D

**Feedback:**

Hydrocele in adult males is normally considered benign condition that does not warrant treatment unless mobility is affected. Fluid accumulates in the space between the tunica vaginalis and tunica albuginea, not within the testes themselves, and hormone therapy is not indicated.

7. A 14-year-old boy has been brought to the emergency department by his mother in excruciating pain that is radiating from his scrotum to his inguinal area. The boy's heart rate is 122 beats/minute, and he has vomited twice before arrival at the hospital. Examination reveals that his scrotum is reddened and slightly swollen, and the testes are firm to touch and tender, with extensive cremaster muscle contraction noted. What is the boy's most likely diagnosis?

A) Epididymitis  
B) Hydrocele  
C) Testicular torsion  
D) Varicocele

Ans: C

**Feedback:**

The combination of the boy's age, signs, and symptoms is indicative of testicular torsion. Epididymitis normally lacks cremaster muscle involvement, and hydrocele is marked by massive distention of the scrotum. Varicocele is often asymptomatic or marked by heaviness in the scrotum.

8. A medical student is assessing a 22-year-old male who has come to the emergency department because of pain and swelling in his scrotum over the past 36 hours. The attending physician has told the student that she suspects epididymitis. Which of the medical student's following questions is most likely to be useful in the differential diagnosis of epididymitis?

A) "Do you know if your vaccinations for mumps are up to date?"  
B) "Have you had unprotected sex in the past?"  
C) "Do you have a sensation of heaviness in the left side of your scrotum?"  
D) "Has it been painful when you get an erection lately?"

Ans: B

**Feedback:**

Sexually transmitted infections are a common contributing factor to epididymitis. Mumps are more often a precursor to orchitis, and heaviness on the left side is associated with varicocele. Pain with an erection is not a noted symptom of epididymitis.



9. A 20-year-old male has been diagnosed with testicular cancer and is seeking information about his diagnosis from a number of Web sites. Which of the following statements that he has read is most plausible?
- A) "Testicular cancer is a leading cause of death among males who should be in the prime of their life."
  - B) "Men with cryptorchidism—the term for an undescended testicle—are known to have a higher risk of developing testicular cancer."
  - C) "For most men with testicular cancer, bloody urine is their first sign that something is wrong."
  - D) "Recent developments in the treatment of testicular cancer mean that few men now need to have a testicle removed."

Ans: B

**Feedback:**

Cryptorchidism is an identified risk factor for the development of testicular cancer. The diagnosis is no longer a leading cause of death. Hematuria is not a common symptom, and orchiectomy is still the standard treatment modality.

10. A 34-year-old male has been diagnosed with testicular cancer after he visited his family physician with a complaint of an enlarged, painful testicle. Biopsy has indicated that his tumor is malignant, and his oncologist believes that the tumor arose in the seminiferous epithelium and is producing a uniform population of cells. What is the client's most likely specific diagnosis?
- A) Seminoma
  - B) Choriocarcinoma
  - C) Germ cell tumor
  - D) Nonseminoma

Ans: A

**Feedback:**

Seminomas are the subtype of germ cell tumors that are most common in the fourth decade and are thought to originate with the seminiferous epithelium and produce a uniform cell population. Nonseminomas tend to produce a variety of cell types, and choriocarcinoma is rare variant of nonseminoma testicular cancer that originates in the placental tissue.

11. While teaching a health class to junior and senior male high school students, the school nurse educates them regarding the first sign of testicular cancer, which would include
- A) one testicle being lower than the other in the scrotal sac.
  - B) enlargement of the testicle.
  - C) back pain.
  - D) coughing bloody sputum.

Ans: B

**Feedback:**

Often the first sign of testicular cancer is a slight enlargement of the testicle that may be accompanied by some degree of discomfort. Back pain and hemoptysis are last signs leading to a metastatic lesion. It is normal for the testicle to hang lower than the other.

12. Which of the following teaching points by an oncologist is most appropriate for a 33-year-old male who will begin treatment shortly for his testicular cancer?
- A) "Thanks to new treatment advances, there's a very good chance that I won't have to remove a testicle."
  - B) "If steroid treatment fails, then we can consider surgery and/or chemotherapy."
  - C) "You should know that there might be adverse effects on your sexual function after treatment is finished."
  - D) "The advantage of performing an orchiectomy over other treatments is that it rules out recurrence."

Ans: C

**Feedback:**

Orchiectomy is the standard treatment for testicular cancer. Steroidal treatments are not used, and sexual function is commonly affected. Recurrence is possible even after orchiectomy.

13. A nurse practitioner has a 30-year-old male patient presenting with fever and chills, urinary frequency and urgency, and pain with urination. A urine sample displays cloudy and foul-smelling urine. During digital rectal exam of the prostate, the nurse notes a thick white discharge. A likely diagnosis would be
- A) urinary tract infection requiring a prescription of sulfur drugs.
  - B) acute bacterial prostatitis requiring antimicrobial therapy.
  - C) testicular cancer requiring appointment with an urologist.
  - D) inflammation of the epididymis requiring scrotal elevation.

Ans: B

**Feedback:**

Manifestations of acute bacterial prostatitis include fever and chills, malaise, frequent and urgent urination, and dysuria. The urine may be cloudy and malodorous because of urinary tract infection. Rectal examination reveals a swollen, tender prostate. During exam, prostatic massage produces a thick discharge with WBCs that grow a large numbers of pathogens on culture.

14. Following a long history of intermittent back pain and urinary urgency, a 50-year-old client has been diagnosed with chronic bacterial prostatitis. Which of the following factors is most likely to influence his health care provider's choice of treatment?
- A) The diagnosis is thought to have an autoimmune etiology with limited response to steroid treatments.
  - B) Antibacterial drugs penetrate poorly into the chronically inflamed prostate.
  - C) Urethral catheterization provides symptom relief and contributes to resolution of the underlying infection.
  - D) There are no proven treatments for chronic prostatitis that address the infectious process.

Ans: B

**Feedback:**

The fact that antibacterial drugs penetrate poorly into the chronically inflamed prostate makes treatment difficult. Inflammatory prostatitis, not chronic prostatitis, is believed to be an autoimmune problem. Urethral catheterization does not provide resolution of the underlying infection, though treatment modalities do exist.

15. When explaining to a patient why his prostate is enlarging, the nurse will mention that which of the following hormones may contribute to the prostatic hyperplasia? Select all that apply.
- A) Glucocorticoids
  - B) Testosterone
  - C) Dihydrotestosterone
  - D) Estrogens
  - E) Progesterone

Ans: B, C, D

**Feedback:**

Both androgens (testosterone and dihydrotestosterone) and estrogens appear to contribute to the development of BPH. Testosterone is the most important factor for prostatic growth. DHT, the biologically active metabolite of testosterone, is thought to be the ultimate mediator of prostatic hyperplasia, with estrogen serving to sensitize the prostatic tissue to the growth-producing effects of DHT. Glucocorticoids do not play a role in making the prostate gland enlarge.

16. A 51-year-old man is receiving his annual physical exam, and his care provider is explaining the rationale for performing a digital rectal exam (DRE). Which of the following statements best captures the rationale for the procedure?
- A) DRE, combined with a measurement of prostate-specific antigen (PSA), is the easiest way to confirm or rule out benign prostatic hyperplasia (BPH).
  - B) The presence of an enlarged prostate provides a definitive diagnosis of prostate cancer.
  - C) If the prostate is hardened on examination, a biopsy is indicated for further investigation.
  - D) DRE is a screening test recommended for men who are experiencing either reduced urine flow or pain on urination.

Ans: C

**Feedback:**

Abnormalities detected during a DRE provide a rationale for further investigation by biopsy. PSA is used to screen for prostate cancer; however, it is also positive in BPH. The anatomic location of the prostate at the bladder neck contributes to the pathophysiology and symptomatology of BPH. A BPH is not a definitive sign of prostate cancer. DRE is recommended annually for all men over age 50.

17. Of the following list of medications, which would likely be prescribed to a patient with benign prostatic hyperplasia (BPH) as a way to decrease the prostate size by blocking the effects of androgens on the prostate?
- A) Finasteride (Proscar), a 5 $\alpha$ -reductase inhibitor
  - B) Imdur (isosorbide mononitrate), a vasodilator
  - C) Birth control pills containing both estrogen and progestin
  - D) Leuprolide (Lupron), a gonadotropin-releasing hormone analog

Ans: A

**Feedback:**

Finasteride (Proscar), a 5 $\alpha$ -reductase inhibitor, reduces prostate size by blocking the effect of androgens on the prostate. Vasodilators, BCPs, and GnRH analogs do not decrease prostate size.

18. A 40-year-old African American patient is at increased risk of developing prostate cancer, since his father was diagnosed with the disease at age 60 and his brother at age 56. What diagnostic measures should be undertaken?
- A) PSA and DRE starting before the age of 50
  - B) Transrectal ultrasonography starting immediately
  - C) PSA and DRE starting at age 50
  - D) Transrectal MRI starting at age 45

Ans: A

**Feedback:**

The current recommendation of the American Cancer Society and the American Urological Association is that men at increased risk of prostate cancer, such as this patient, who has two risk factors, his race and his family history, should begin screening with an annual digital rectal exam (DRE) and prostate-specific antigen (PSA) measurement starting at age 45. The general population is advised to undergo this process starting at age 50. It is important to note that PSA levels can be a marker of either benign prostatic hyperplasia or cancer, and there is some degree of controversy regarding the benefit of screening for it. Although transrectal ultrasonography may detect small cancers, its prohibitive cost excludes its routine use in screening.

19. A 71-year-old man diagnosed with a stage T2 prostate tumor 2 years ago has elected watchful waiting, based upon an underlying heart condition that renders surgery potentially fatal. Recently, his PSA has jumped considerably, as have his levels of serum acid phosphatase. Which course of action would be least appropriate at this stage?
- A) Combination treatment with an antiandrogen and a GnRH agonist
  - B) Treatment with bisphosphonates
  - C) Treatment with GnRH agonists alone
  - D) Treatment with ketoconazole

Ans: C

**Feedback:**

The sharp rise in PSA, coupled with an increase in levels of serum acid phosphatase, is strongly indicative of metastatic cancer (which could be confirmed via molecular imaging such as MRI). Unopposed GnRH agonists initially cause LH and FSH levels to rise, stimulating the production of testosterone, which acts as fuel for the fire of prostatic metastasis. Thus, their use alone would not be appropriate. However, if these agonists are combined with antiandrogens, testosterone levels can be quelled from two different fronts simultaneously. Ketoconazole is a chemical castrating agent that could bring down testosterone levels rapidly and might be more appropriate for cases of advanced and widespread metastasis. Bisphosphonates address the effects of metastatic bone involvement and of osteoporosis resulting from antiandrogen therapy.

20. A patient with excruciating back pain that has been getting worse over the past few months comes to the Emergency Department. His chief complaint is excruciating back pain that has been getting worse over the past few months. He has also noticed decreased sensation in his lower extremities, some urinary incontinence, and feels like he never really empties his bladder all the way after voiding. Following diagnostic testing, the patient is diagnosed with advanced prostate cancer with spinal cord compression. The nurse should anticipate administering which medications to this patient? Select all that apply.
- A) Ketoconazole, a fungicide, to lower serum testosterone levels.
  - B) Bisphosphonates, such as pamidronate, to inhibit bone loss
  - C) Phosphate-binding agents such as aluminum hydroxide
  - D) Sulfonamides with trimethoprim (Bactrim) to treat the urinary tract infection (UTI)
  - E) Calcium carbonate to prevent osteoporosis

Ans: A, B

**Feedback:**

Inhibitors of adrenal androgen synthesis (ketoconazole) are used for treatment of patients with advanced prostate cancer who present with spinal cord compression. This is because these men need rapid decreases in their testosterone levels. The bisphosphonates (pamidronate) act by inhibiting osteoclastic activity. They prevent osteopenia, prevent and delay skeletal complications in patients with metastatic bone involvement, and provide palliation of bone pain. There is no indication that this patient has a UTI. Patients with this malignancy usually have hypercalcemia, and therefore administration of calcium supplements would be contraindicated.

## Chapter 44- Structure and Function of the Female Reproductive System

1. Which of the following statements most accurately captures a characteristic of the external female genitalia?
  - A) Skene and Bartholin glands perform endocrine and exocrine functions.
  - B) Surgical repair is required in the case of a ruptured hymen in prepubescent females.
  - C) The labia majora and clitoris are analogous to the male scrotum and penis, respectively.
  - D) The external genitalia facilitate sexual function and hormonal regulation.

Ans: C

**Feedback:**

Embryonic differentiation results in an anatomical relationship between the labia majora and the scrotum and between the clitoris and the penis. There is no identified hormonal/endocrine role of the structures of the external genitalia, and a ruptured hymen does not necessitate medical intervention.

2. A woman has gone to her gynecologist complaining of pain during intercourse. The physician orders a maturation index on her vaginal scrapings. The results return an index of 75-25-0. The nurse can interpret this to mean
  - A) she is in the beginning of cervical cancer.
  - B) she is in the prime of her reproductive years.
  - C) she is in a perimenopausal phase.
  - D) she is experiencing postmenopausal vaginal dryness.

Ans: D

**Feedback:**

The vaginal scrapings are used for a test, the *maturation index*, that examines the cellular structure and configuration of the vaginal epithelial cells. Typically, this index is 0-40-60 during the reproductive years. With diminished estrogen levels, there is a shift to the left, producing an index of 30-40-30 during the perimenopausal period, and an index of 75-25-0 occurs during the postmenopausal period.

3. A 20-year-old female has come to the clinic complaining of severe menstrual cramps. The clinic nurse practitioner knows that dysmenorrhea occurs when which muscle group contracts?

A) Perimetrium  
B) Myometrium  
C) Endometrium  
D) Fundus

Ans: B

**Feedback:**

The middle muscle layer, the myometrium, forms the major portion of the uterine wall. Contractions of these muscle fibers help to expel menstrual flow and the products of conception during miscarriage or childbirth. When pain accompanies the contractions associated with menses, it is called dysmenorrhea. The perimetrium is the outer layer of the uterus. Endometrium, the inner layer of the uterus, is made up of a basal and a superficial layer. The superficial layer is shed during menstruation and regenerated by cells of the basal layer. The fundus is the portion of the uterus that lies about the insertion of the fallopian tubes.

4. During a group prenatal class, the nurse teaching the course is explaining the thinning of the cervix that accompanies the stages of labor leading up to delivery. A participant admits that she is not familiar with either the location or normal role of the cervix. Which of the following responses by the nurse would be most appropriate?

A) "Your cervix is just the term for the lowest part of your uterus, and it is tightly shut at all times except in woman who are giving birth."  
B) "The cervix is the opening between the uterus and the vagina, and so it opens wide during the lead-up to birth."  
C) "Your cervix is the part of your uterus where the fallopian tubes join in and the baby has to pass through it to the vagina."  
D) "The cervix is the soft lining of your uterus that has to expand greatly to accommodate your baby during delivery."

Ans: B

**Feedback:**

The cervix is best characterized as the neck of the uterus that projects into the vagina. It opens selectively to accommodate menses. The fallopian tubes enter the uterus far above the cervix, and the lining of the uterus is known as the endometrium.



5. Which of the following situations would be considered pathological in an otherwise healthy, 30-year-old female?

- A) The woman's ovaries are not producing new ova.
- B) The woman's ovaries do not synthesize or secrete luteinizing hormone (LH).
- C) The epithelium covering the woman's ovaries is broken during the time of ovulation.
- D) The woman's ovaries are not producing progesterone.

Ans: D

**Feedback:**

As the number of ova within an ovary is fixed at birth and decreases over time, a lack of production of ova is normal. The epithelial lining is normally broken during ovulation, and the LH is produced by the pituitary gland. A lack of progesterone would be considered pathological.

6. A pregnant client who is taking Risperidone (Risperdal), an antipsychotic prescribed for her bipolar disorder, is at high risk for developing which of the following hormonal adverse effects?

- A) Increased growth hormone production
- B) Decreased human chorionic gonadotropin levels
- C) Excess prolactin secretion
- D) Decreased follicle-stimulating hormone secretion

Ans: C

**Feedback:**

Although prolactin does not appear to play a physiologic role in ovarian function, hyperprolactinemia leads to hypogonadism. Hyperprolactinemia may occur as an adverse effect of drug treatment using phenothiazine derivatives (*i.e.*, antipsychotic drugs that block dopamine receptors).

7. A 40-year-old woman has been identified to have a deficiency in estrogen. Which of the following physiological phenomena is most likely to remain unaffected?

- A) Parathyroid hormone antagonism and the rate of bone resorption
- B) The regulation of uterine endothelial development
- C) The maintenance of normal skin and blood vessel structure
- D) The synthesis and release of adrenal glucocorticoids

Ans: D

**Feedback:**

Synthesis and release of adrenal glucocorticoids are not directly influenced by estrogen, unlike the processes of bone resorption, endothelial regulation, and the maintenance of skin and blood vessel structure.

8. Which of the following statements best captures an aspect of the role of progesterone?

Progesterone

- A) production begins shortly after conception and peaks prior to delivery.
- B) is responsible for the stimulation of lactation in the postpartum period.
- C) levels peak after ovulation and is present throughout the menstrual cycle.
- D) is the primary hormone responsible for the development of female secondary sex characteristics.

Ans: C

**Feedback:**

Progesterone is present in varying levels at all times in females, but peaks following ovulation. It is not responsible for lactation and does not have primary responsibility for the development of secondary sex characteristics.

9. Events in the ovulatory cycle progress in a similar manner each month. Place the following events in the ovulatory cycle in the correct chronological order. Use all the options.

- A) Formation of the theca
- B) Formation of the corpus luteum
- C) Formation of the antral follicle
- D) Development of the zona pellucida
- E) Bursting of the mature follicle

Ans: D, A, C, E, B

**Feedback:**

The zona pellucida surrounds a primary oocyte as it transitions to a secondary follicle, after which the theca surrounds the follicle. The antrum is subsequently formed around the maturing follicle, and it eventually bursts. After ovulation, the corpus luteum is established marking the beginning of the luteal stage of the ovulatory cycle.

10. A 29-year-old woman has been trying for many months to become pregnant, and fertilization has just occurred following her most recent ovulation. What process will now occur that will differentiate this ovulatory cycle from those prior?
- A) Human chorionic gonadotropin will be produced, preventing luteal regression.
  - B) The remaining primary follicles will provide hormonal support for the first 3 months of pregnancy.
  - C) The corpus luteum will atrophy and be replaced by corpus albicans.
  - D) The basal layer of the endometrium will be sloughed in preparation for implantation.

Ans: A

**Feedback:**

Fertilization is followed by the release of human chorionic gonadotropin. The corpus luteum, not primary follicles, provides hormonal support for early pregnancy. The atrophy of corpus luteum and its replacement by corpus albicans only occur when fertilization does not take place. The endometrium will be preserved following fertilization.

11. Long, stretchy cervical mucus that exhibits ferning on a microscope slide is characteristic of which of the following?
- A) Crystallization of inorganic salts
  - B) Low estrogen levels
  - C) High progesterone levels
  - D) Low human chorionic gonadotropin levels

Ans: A

**Feedback:**

Cervical mucus that exhibits ferning and so-called spinnbarkeit occurs right around the time of ovulation (midcycle) due to increased water content and alteration in the concentration of inorganic salts. This is influenced by high serum levels of estrogen, which lead to the LH spike that promotes ovulation (bursting of the oocyte from the mature follicle). Progesterone levels increase only after ovulation during the luteal phase, at which point the cervical mucus “dries up” (becomes more scant).

12. After hearing daunting reports from her slightly older coworkers and friends, a 44-year-old woman has a number of questions for her physician about what to expect during perimenopause and why. Which of the following teaching points is most accurate?
- A) "The decrease in estrogen and most other hormones in your body do cause a lot of instability for most women around menopause."
  - B) "Hot flashes are a reality for most women in menopause, and the exact cause of them isn't known yet."
  - C) "The emotional swings that often accompany menopause result from changes to the limbic center in the brain, which governs emotion."
  - D) "There are a lot of changes to the gastrointestinal and respiratory systems that exist around menopause that ultimately result from estrogen deficiency."

Ans: B

**Feedback:**

Hot flashes are a common accompaniment to menopause, and their exact etiology is not known. Menopause is caused by a gradual reduction in ovarian estrogen production, but decreases in other hormones do not commonly occur. Organic brain changes are not a noted component of menopause, and GI and respiratory symptoms are not prevalent.

13. The nurse knows that when combined continuous estrogen–progesterone therapy (CCEPT) is prescribed, the drug is considered effective if which of the following occurs?
- A) More regular periods for women with irregular menses
  - B) Inhibited endometrial development resulting in no menses
  - C) Relaxation of the myometrium, thereby limited painful cramps
  - D) Shedding of the endometrial build-up on a more regular basis

Ans: B

**Feedback:**

Thus, continuous exposure to progesterone inhibits endometrial development. Eventually, the combined continuous estrogen–progesterone therapy (CCEPT) results in no bleeding. It can be associated with irregular bleeding and spotting until the lining becomes atrophic. It relieves cramps rather than generating them.

14. A 51-year-old woman who has been receiving estrogen and progesterone therapy (EPT) for the last 5 years has visited her care provider because her peers have told her about the risks of heart disease, stroke, and breast cancer that could accompany hormone therapy (HT). How should her care provider respond to her concerns?

A) "There is a demonstrable increase in breast cancer risk with HT, but the risk of stroke or heart disease actually go down slightly."

B) "All considered, the benefits of HT outweigh the slightly increased risks of heart disease, stroke, or breast cancer."

C) "HT is actually associated with a decrease in heart disease risk, but there is an increase in stroke risk; the breast cancer connection is still unclear."

D) "There's in fact a slight protective effect against stroke associated with HT, but this is partially offset by increased rates of heart disease and breast cancer."

Ans: C

**Feedback:**

Current evidence shows a decrease in coronary heart disease (CHD) risk with HT but an increase in CVA risk; the evidence regarding breast cancer is still indefinite.

15. A woman consults her physician about a study (Women's Health Initiative) discussing an increased risk for breast cancer if taking hormones. The physician can allay her fears by sharing which of the following findings?

A) Only women with a family history of breast cancer had an increased risk for developing breast cancer while on birth control pills.

B) This 26% increased risk for developing invasive breast cancer occurred in women taking combined continuous estrogen–progesterone therapy.

C) The increased risk for developing inflammatory breast cancer occurred in women taking hormone replacement therapy when they were over the age of 45.

D) Follow-up studies demonstrated that there was only a 3% increase in risk for developing breast cancer if hormones were discontinued immediately.

Ans: B

**Feedback:**

The WHI added to the breast cancer concern by reporting a 26% increased risk of invasive breast cancer in the women using CCEPT. Results from a 3-year WHI follow-up study revealed that the breast cancer risk of women who stopped taking CCEPT continued at a rate similar to that observed during the intervention.

16. The Women's Health Initiative results have led the Institute of Medicine (2010) to recommend which of the following guidelines related to hip fractures in women?
- A) All postmenopausal women should take 1200 mg of calcium per day to prevent osteoporosis.
  - B) The standard daily recommended amount of vitamin D was increased to 400 IU/day.
  - C) All adults should take 600 IU/day of vitamin D to maintain healthy bones.
  - D) A combination of calcium and vitamin D does not appear to prevent hip fractures.

Ans: C

**Feedback:**

The release of data from two clinical trials within the WHI (low-fat dietary patterns, calcium and vitamin D supplementation) has challenged conventional wisdom in other areas. The use of calcium (1000 mg/day) plus vitamin D (200 IU/day) was shown to result in a small but significant improvement in hip bone density but failed to reduce the risk of hip fractures. The IOM recommends that all adults should take 600 IU/day of vitamin D to maintain healthy bones.

17. Having heard positive reports of the benefits of hormone therapy (HT) from her sister-in-law and friends, a 49-year-old woman has presented to her family physician asking to start HT. Her uterus is intact, and previous bone scans have indicated low bone density. The client also has a family history of heart disease. She characterizes her symptoms of menopause as “noticeable, but not debilitating by any means.” Based on the most current research, what is her physician's best course of action?
- A) Begin estrogen–progesterone HT (EPT) to prevent future menopausal symptoms and coronary heart disease (CHD).
  - B) Forego HT in light of her preexisting low bone density and consequent risk of osteoporosis.
  - C) Forego HT but consider alternative therapies and reevaluate if her symptoms significantly affect her quality of life.
  - D) Begin low-dose HT but perform regular breast cancer screening and heart health checks.

Ans: C

**Feedback:**

Current recommendations for HT, in light of the findings of the WHI and other clinical trials, are to avoid HT for primary or secondary prevention of CHD; develop an individual risk profile for every woman contemplating HT and provide information regarding known risks; utilize HT only in those women who require relief from menopausal symptoms that affect quality of life; consider lower than standard doses and alternative routes of administration; limit the use of HT to the shortest duration consistent with goals, benefits, and risks of treatment for each woman; and because of the potential risks associated with HT products that are FDA approved for the prevention of postmenopausal osteoporosis, consider alternative therapies if the woman is not symptomatic.

18. A 13-year-old female is undergoing rapid development of her breasts after experiencing menarche several months ago. Which of the following hormones are active in the development of her breasts? Select all that apply.

- A) Prolactin
- B) Human growth hormone
- C) Luteinizing hormone
- D) Estrogen
- E) Follicle-stimulating hormone
- F) Progesterone

Ans: A, C, D, E, F

**Feedback:**

In women, the pituitary release of FSH, LH, and prolactin at puberty stimulates the ovary to produce and release estrogen. This estrogen stimulates the growth and proliferation of the ductile system. With the onset of ovulatory cycles, progesterone release stimulates the growth and development of ductile and alveolar secretory epithelium.

19. A 13-year-old patient undergoing puberty is alarmed to find small, white bumps surrounding the areolae on her nipples. You reassure her that these are a normal sign of her sexual maturation and tell her that they are which of the following?

- A) Skene glands
- B) Bartholin glands
- C) Montgomery tubercles
- D) Cooper ligaments

Ans: C

**Feedback:**

The small bumps or projections on the areolar surface known as *Montgomery tubercles* are sebaceous glands that keep the nipple area soft and elastic. At puberty and during pregnancy, increased levels of estrogen and progesterone cause the areola and nipple to become darker and more prominent and the Montgomery glands to become more active.

20. While explaining milk production and release to a group of expectant parents, the nurse educates the parents on the fact that suckling by the infant provides the stimulus for milk ejection. This suckling sends feedback to the hypothalamus, which stimulates the release of which hormone from the pituitary gland responsible for the ejection of milk into the ductal system?

A) Oxytocin  
B) Prolactin  
C) Progesterone  
D) Follicle-stimulating hormone

Ans: A

**Feedback:**

During lactation, milk is secreted by alveolar cells, which are under the influence of the anterior pituitary hormone prolactin. Milk ejection from the ductile system occurs in response to the release of oxytocin from the posterior pituitary. The suckling of the infant provides the stimulus for milk ejection. Suckling produces feedback to the hypothalamus, stimulating the release of oxytocin from the posterior pituitary. Oxytocin causes contraction of the myoepithelial cells lining the alveoli and ejection of milk into the ductal system.



## Chapter 45- Disorders of the Female Reproductive System

1. After a long and frustrating course of constant vaginal pain, a 38-year-old woman has diagnosed with generalized vulvodynia by her gynecologist. What treatment plan is her physician most likely to propose?
  - A) Alternative herbal therapies coupled with antifungal medications
  - B) Antidepressant and antiepileptic medications
  - C) Lifestyle modifications aimed at accommodating and managing neuropathic pain
  - D) Narcotic analgesia and nonsteroidal anti-inflammatory medications

Ans: B

**Feedback:**

Treatment of vulvodynia necessitates a long-term, chronic pain approach; antidepressants and antiepileptic medications are often used. Alternative therapies, standard analgesic regimens, and simple lifestyle modifications are less likely to be effective.

2. A 57-year-old woman has been diagnosed with atrophic vaginitis and has expressed surprise to her care provider, citing a lifetime largely free of gynecological health problems. She has asked what may have contributed to her problem. How can the care provider best respond?
  - A) "The lower levels of estrogen since you've begun menopause make your vagina prone to infection."
  - B) "Vaginitis is not usually the direct result of any single problem, but rather an inevitability of the vaginal dryness that accompanies menopause."
  - C) "This type of vaginitis is most commonly a symptom of a latent sexually transmitted infection that you may have contracted in the distant past."
  - D) "The exact cause of this problem isn't known, but it can usually be resolved with a diet high in probiotic bacteria."

Ans: A

**Feedback:**

The lack of vaginal epithelial regeneration after menopause predisposes older woman to vaginitis. It is not necessarily a result of vaginal dryness and is not likely sexually transmitted. The etiology is not unknown, and diet alone is unlikely to resolve the problem.

3. Which of the following women is most likely to have a sexually transmitted infection as a contributing factor to her health problem?

- A) A 29-year-old woman with a diagnosis of localized vulvodynia
- B) A 40-year-old who is being treated for vaginal cancer
- C) A 32-year-old who is undergoing diagnostics to rule out endometriosis
- D) A 41-year-old with a diagnosis of mucopurulent cervicitis

Ans: D

**Feedback:**

While *C. albicans*, *T. vaginalis*, *Neisseria gonorrhoeae*, *Gardnerella vaginalis*, *Chlamydia trachomatis*, *Ureaplasma urealyticum*, and herpes simplex virus can all contribute to cervicitis. *C. trachomatis* is the organism most commonly associated with mucopurulent cervicitis. Vulvodynia, vaginal cancer, and endometriosis are less likely to have a sexually transmitted etiology.

4. While educating a mother about the benefits of giving her child the human papilloma virus (HPV) vaccine, gardasil, which of the following statements will the nurse need to clarify for the parent? Select all that apply. The vaccine is

- A) best administered before the child becomes sexually active.
- B) 100% effective against development of cervical cancer for her life span.
- C) effective against the two most common strains of genital warts.
- D) only recommended for females between the ages of 9 and 26.
- E) recommended prior to exposure to HPV, and if the child has genital warts, they are already exposed.

Ans: B, D

**Feedback:**

The HPV vaccine has decreased the risk of cervical cancer by 97%. Gardasil is one type of HPV vaccine to prevent infection with the HPV subtypes 16, 18, 9, and 11. This vaccine has been approved for girls and boys between 9 and 26 years of age (prior to becoming sexually active) to prevent HPV 6 and 11 genital warts. The vaccine targets the two strains of HPV (16 and 18) responsible for 70% of the cervical cancer. There is no treatment that is 100% effective against cervical cancer.

5. A 28-year-old female has been told she has atypical glandular cells following Pap smear. The physician will likely recommend which procedure that can be performed in his office to remove the abnormal zone and provide a specimen for further histological evaluation?
- A) Cone biopsy
  - B) Intracavitary irradiation
  - C) Trachelectomy
  - D) Loop electrosurgical excision procedure (LEEP)

Ans: D

**Feedback:**

Because adenocarcinoma of the cervix is being detected more frequently, especially in women younger than 35 years of age, a Pap smear result of atypical glandular cells warrants further evaluation. The LEEP has taken the place of cone biopsies in most situations and is now the first-line management for CIN II/III. This outpatient procedure allows for the simultaneous diagnosis and treatment of dysplastic lesions found on colposcopy. In skilled hands, this wire can remove the entire transformation zone, providing adequate treatment for the lesion while obtaining a specimen for further histological evaluation. Cone biopsy is a surgical procedure that removes a cone-shaped wedge of cervix. Trachelectomy is removal of the cervix, and intracavitary irradiation is a form of brachytherapy to treat cervical cancer.

6. A nurse who works on a urology–gynecology ward of a hospital is coming on shift and will be caring for a 34-year-old woman who has been admitted overnight for the treatment of a large endometriosis. What interventions should the nurse most realistically anticipate providing over the course of the shift and the next several days?
- A) Providing pain control; preparing the client for a laparoscopic procedure or hysterectomy.
  - B) Administration of packed red blood cells to compensate for low hemoglobin; administering hormone therapy.
  - C) Assisting with a Pap smear; administration of high-dose corticosteroids.
  - D) Administration of male androgens to minimize endometrial hyperplasia; facilitating a dilation and curettage.

Ans: A

**Feedback:**

Pain control is central to treatment of endometriosis, and surgical treatment is ideally performed laparoscopically, though hysterectomy is sometimes indicated. Bleeding is not a common symptom of endometriosis, and neither corticosteroids nor male androgens are common treatments.

7. A 60-year-old woman who is 11 years menopausal has presented to the emergency department stating, "I haven't had my period in years, but lately I've been bleeding again, and quite heavily in the last few days." The care team needs to rule out endometrial cancer. How should they best explain the most accurate plan for confirming or ruling out the diagnosis?
- A) "We're going to book a CT scan for you as soon as possible so that we can see what is inside your uterus."
  - B) "We're going to have to open your cervix with a speculum and take scrapings from the wall of your uterus."
  - C) "We are going to order blood work that will measure your hormone levels."
  - D) "We can do a Pap smear right now, and we will get the results as soon as we can."

Ans: B

**Feedback:**

D&C is a more accurate diagnostic procedure for endometrial cancer than CT, Pap smear, or blood work analysis.

8. Following a visit to her campus medical clinic motivated by persistent abdominal pain and dyspareunia, a 20-year-old female college student has been referred for a diagnostic workup to rule out pelvic inflammatory disease. Her elevated white cell and C-reactive protein levels lead her care provider to suspect pelvic inflammatory disease (PID). What follow-up question is most likely to help with the differential diagnosis?
- A) "Are you using tampons during your period or do you normally use pads?"
  - B) "What does your daily hygiene routine usually consist of?"
  - C) "How many sexual partners have you had?"
  - D) "Have you ever had a therapeutic abortion in the past?"

Ans: C

**Feedback:**

Having multiple sex partners is a factor that has been identified in the development of PID. The use of tampons, inadequate hygiene, and a history of TA are less likely to predispose to PID.

9. Prior to performing a laparoscopy, a patient exhibiting which of the following clinical manifestations would be treated with oral antibiotic therapy for suspected pelvic inflammatory disease (PID)? Select all that apply.

- A) Lower abdominal pain.
- B) Tenderness when cervix is touched during bimanual exam.
- C) Feeling of fullness and bloating in abdomen.
- D) Purulent cervical drainage noted on tissue after voiding.
- E) Elevated white cell count.

Ans: A, B, D, E

**Feedback:**

The symptoms of PID include lower abdominal pain, which may start just after a menstrual period; dyspareunia; back pain; purulent cervical discharge; adnexal tenderness; and cervical motion tenderness on bimanual examination with no other apparent cause. Fever, increased erythrocyte sedimentation rate, and elevated WBC are commonly seen.

10. Which of the following sexually active women most likely faces the highest risk of developing an ectopic pregnancy?

- A) A 14-year-old who experienced menarche 2 years prior.
- B) A 42-year-old who has decided to try to have one more child and has had her tubal ligation reversed.
- C) A 27-year-old who stopped using medroxyprogesterone contraceptive injection (Depo-Provera) several months ago.
- D) A 22-year-old who has a history of anorexia nervosa and who has a body mass index (BMI) of 12.0 (normal weight = 18.5 to 24.9).

Ans: B

**Feedback:**

Previous tubal ligation is an identified risk factor for ectopic pregnancy. Young age, use of injectable contraception, and low BMI are not specifically associated with ectopic pregnancy.

11. A 23-year-old woman has been referred to a fertility clinic after 1 year of attempting to become pregnant. Her diagnostic workup has resulted in a diagnosis of polycystic ovary syndrome (PCOS). What will the first line of treatment most likely consist of?

- A) Estrogen–progesterone hormone therapy and the administration of clomiphene
- B) Surgical resection of the ovaries using laparoscopy
- C) Lifestyle modifications to include weight loss by lowering calories and fat consumption
- D) Temporary use of oral contraceptive agents

Ans: C

**Feedback:**

Lifestyle modifications are the treatment of choice for PCOS. Hormone therapy, surgery, and use of oral contraceptives are less likely to be a primary treatment option.

12. While teaching a class on female cancers, the instructor emphasizes to the nursing students that many patients with ovarian cancer may display

- A) abdominal pain, bloating, feeling full quickly after ingesting food.
- B) pain after intercourse, bleeding irregularities, perineal tenderness.
- C) colicky low abdominal pain, adnexal mass present without palpation.
- D) lower abdominal pain localized to one side, referred shoulder pain.

Ans: A

**Feedback:**

Symptoms that are believed to have a strong correlation to ovarian cancer include abdominal pain, increased abdominal size or bloating, and difficulty in eating or feeling full quickly after ingesting food. Pain and bleeding after intercourse are usually associated with an inflammatory process. Colicky low abdominal pain and adnexal mass are associated with cancer of the fallopian tube. Localized abdominal pain to one side with referred shoulder pain is common in ectopic pregnancy.

13. A 70-year-old woman who delivered four children during her reproductive years has weakened pelvic floor muscles. Which of her following anatomical structures is least susceptible to inappropriate herniation into her vagina?

- A) Peritoneum
- B) Uterus
- C) Bladder
- D) Rectum

Ans: A

**Feedback:**

While displacement of the uterus, bladder, and rectum can result in uterine prolapse, cystocele, and rectocele, the peritoneum is unlikely to prolapse into the vagina.

14. A college student has come to the health clinic complaining of heavy bleeding during and between her menstrual periods. The nurse practitioner will document this as

- A) dyspareunia.
- B) amenorrhea.
- C) polymenorrhea.
- D) menometrorrhagia.

Ans: D

**Feedback:**

Menometrorrhagia is heavy bleeding during and between menstrual periods. Polymenorrhea is frequent menstruation with periods less than 21 days apart. Amenorrhea is absence of menstruation. Dyspareunia is pain following intercourse.

15. Following a workup that included endocrine studies (FSH/LH, prolactin, testosterone, DHEAS levels), a 22-year-old college student complaining of abnormal bleeding has been diagnosed with dysmenorrhea due to alterations in her hormone levels. The nurse should anticipate that she will likely be prescribed: Select all that apply.

- A) oral contraceptives.
- B) estrogen only.
- C) prostaglandin synthetase inhibitors.
- D) anxiolytic medications.
- E) androgens.

Ans: A, C

**Feedback:**

The treatment of dysfunctional bleeding of a nonhormonal nature is usually treated with oral contraceptives or cyclic progesterone therapy. Prostaglandin synthetase inhibitors are prescribed for dysmenorrhea. Anxiolytic drugs treat mood changes of PMS.

16. A 15-year-old female has presented to her family physician complaining of frequent discomfort around the time of her period. She has subsequently been diagnosed with primary dysmenorrhea. Which of the following treatments is most likely to be effective?

- A) Investigation and resolution of her hypothalamic–pituitary–ovarian disorder
- B) Hormone therapy aimed at resolving her estrogen deprivation
- C) Pain control with prostaglandin synthetase inhibitors
- D) Dilation and curettage

Ans: C

**Feedback:**

Because she has been diagnosed with primary rather than secondary dysmenorrhea, treatment of a specific underlying condition is not indicated. Treatment will likely focus on adequate pain control. D&C is not a relevant intervention.

17. A patient who is still breast-feeding her infant has arrived at the clinic complaining of sore breasts. The physician has diagnosed mastitis. Which of the following statements made by the patient will require correction by the nurse?
- A) "They tell me this is usually caused by a Staph infection."
  - B) "I need to make sure to wash my hands thoroughly before touching my breasts."
  - C) "I need to stop breast-feeding until all my antibiotics have been taken."
  - D) "A clogged duct in my breast has become clogged."

Ans: C

**Feedback:**

Mastitis is inflammation of the breast. It most frequently occurs during lactation but also can result from other conditions. In the lactating woman, inflammation results from an ascending infection that travels from the nipple to the ductile structures. The most common organism isolated is *Staphylococcus*. The offending organism originates from the suckling infant's nasopharynx or the mother's hands. Infection and inflammation cause obstruction of the ductile system. The breast becomes hard and, inflamed. It is advisable for the mother to continue breast-feeding during antibiotic therapy to prevent this.

18. Staff at a women's health center are being briefed by their supervisor on the latest recommendations for breast cancer screening. Which of the following guidelines should staff pass on to their clients?
- A) "Breast self-exam should be ideally performed around the time of the month that you think you're ovulating."
  - B) "The most important thing you can do to identify breast cancer early is to perform regular, systematic self-exams."
  - C) "All postmenarche females should get a clinical exam by a trained professional on an annual basis."
  - D) "Screening mammography and clinical exams are the cornerstones of breast cancer screening."

Ans: D

**Feedback:**

Self-exam has recently been deemphasized by the American Cancer Society with emphasis now placed on mammography and trained exam. If done, self-exam should be performed around the time of menses, and clinical exams every 3 years are believed to be sufficient for women under 40.



19. A 31-year-old patient with breast cancer is concerned about being prescribed a hormonal medication to help block the effects of estrogen on the growth of breast cancer cells. The nurse should provide education about which of the following likely medications?

- A) Trastuzumab (Herceptin), a biologic therapy
- B) Nolvadex (Tamoxifen), a nonsteroidal antiestrogen
- C) Progesterone, a hormone.
- D) Arimidex (anastrozole), an aromatase inhibitor.

Ans: B

**Feedback:**

Hormone therapy is used to block the effects of estrogen on the growth of breast cancer cells. Tamoxifen is a nonsteroidal antiestrogen that binds to estrogen receptors and blocks the effects of estrogens on the growth of malignant cells in the breast. Herceptin is used to stop the growth of breast tumors that express the HER2/neu receptor on their cell surface. Arimidex, an aromatase inhibitor, blocks the enzyme that converts androstenedione and testosterone to estrogen in the peripheral tissues. This reduces the circulating estrogen levels in postmenopausal women.

20. A 31-year-old woman and her husband have presented to their family physician due to their inability to conceive a child after trying for the last 18 months. Which of the following will the nurse practitioner want to specifically rule out as potential contributing factors? Select all that apply.

- A) Cryptorchidism in the husband
- B) Slow maturation of the endothelial lining after ovulation
- C) Low levels of LH and FSH in the wife
- D) Large amounts of clear, stretchy cervical mucus
- E) Sexually transmitted diseases like gonorrhea or chlamydial infection.

Ans: A, B, C, E

**Feedback:**

Cryptorchidism, luteal phase defects, low pituitary hormone levels, and an inability of the tubes to pick up an ovum can all contribute to infertility. A large amount of clear, stretchy cervical mucus is a normal finding. Cervical cultures for gonorrhea, chlamydial infection, and mycoplasmal infection should be obtained and treatment instituted as needed.

## Chapter 46- Sexually Transmitted Infections

1. During unprotected sex, a 17-year-old female high school senior has been exposed to the human papillomavirus (HPV). The school nurse would recognize that the student is at a considerable risk of developing which of the following diagnoses?

A) Genital herpes  
B) Gonorrhea  
C) Condylomata acuminata  
D) Candidiasis

Ans: C

**Feedback:**

HPV is an identified precursor to condylomata acuminata, or genital warts. Herpes, gonorrhea, and candidiasis are not likely to result directly from HPV.

2. A campus-based peer counseling group is conducting an information blitz on sexually transmitted diseases. Which of the following statements about genital warts requires correction?

A) "Genital warts can take up to a month after exposure to first become visible."  
B) "There is no existing treatment that can eradicate the virus once it's contracted."  
C) "Condoms do not necessarily prevent the transmission of the virus that causes genital warts."  
D) "There are a number of subtypes of the virus that cause genital warts, but current vaccines protect against most common causes of them."

Ans: A

**Feedback:**

Genital warts can take between 6 weeks to 8 months to incubate after exposure. The virus cannot be eliminated, and condoms do not provide proven protection. Vaccine protects against 4 HPV types.

3. A 31-year-old male was diagnosed with genital herpes of the HSV-2 type 5 years ago. He is now broaching the subject with a woman he has recently formed a relationship with. Which of his statements is most accurate?

A) "If you've been exposed to the herpes virus in the past, then there's no significant risk of reinfection."  
B) "The worst case scenario is that you'll develop cold sores, since this is the type of herpes virus that I've got."  
C) "If you've had cold sores when you were younger, it means that you've got antibodies against this type of herpes virus."  
D) "Even when I'm not having a recurrence, I could still pass the virus on to you."

Ans: D

**Feedback:**

HSV transmission can occur both during and between recurrences. HSV-2 is associated more with genital herpes than cold sores, and cold sores do not provide antibody protection. Prior contact with the virus does not confer immunity.

4. A male college student has arrived at the student clinic complaining of tingling, itching, and pains in his groin. Upon inspection, the nurse notices some pustules and vesicles. While taking a detailed sexual history, the nurse should ask which of the following questions to rule out further complications?

A) "Do you get cold sores very often?"  
B) "Do you have pain when you urinate or have difficulty starting the stream?"  
C) "Have you noticed excessive swelling in your scrotum the last few days?"  
D) "Have you been experiencing flank pain and bloody urine?"

Ans: B

**Feedback:**

The initial symptoms of primary genital herpes infections include tingling, itching, and pain in the genital area, followed by eruption of small pustules and vesicles. In men, the infection can cause urethritis and lesions of the penis and scrotum. Urethritis is characterized by pain with urination and difficulty starting the stream. Cold sores are not related to genital herpes. Swelling of the scrotum is common in epididymitis, while flank pain and bloody urine are associated primarily with kidney stone formation.

5. A pregnant 23-year-old diagnosed with herpes simplex virus (HSV) is receiving prenatal care from her family physician. To prevent transmission of the virus to her baby, the physician will educate to include which of the following accurate statements?

A) "After your caesarean section, it will be safest if you don't breast-feed your child."  
B) "If there aren't any visible lesions when you enter labor, a vaginal delivery will be safe to go ahead with."  
C) "A vaginal delivery will be safe as long as you are consistent with taking your valacyclovir."  
D) "We'll have to book you a caesarian delivery in order to ensure your baby isn't exposed to the virus."

Ans: B

**Feedback:**

Vaginal delivery is safe in the absence of lesions at the onset of labor. HSV does not preclude breast-feeding, and antivirals would not be commonly used in pregnancy, nor would they guarantee a risk-free vaginal delivery.

6. A 20-year-old male has presented to a health clinic with multiple genital lesions that are filled with a viscous, creamy exudate and has subsequently been diagnosed with molluscum contagiosum. What is his care provider most likely to tell him about the plan for treating the diagnosis?
- A) "This kind of infection often subsides on its own and doesn't grow more serious over time."
  - B) "These lesions usually respond well to oral antiviral medications."
  - C) "Treatment of this problem is usually successful, but if untreated, it can lead to sterility."
  - D) "The bacteria that cause this disease are often latent for several years at a time, and you would be contagious for the entire period."

Ans: A

**Feedback:**

Molluscum contagiosum is considered a benign and self-limiting viral illness. Oral antivirals are not a common treatment, and it is not noted to lead to sterility.

7. After hearing horror stories about the signs, symptoms, and course of lymphogranuloma venereum (LGV), a high school student has asked a visiting sexual health educator about the odds of acquiring the disease among sexually active Americans. Which of the following facts will most accurately underlie the educator's response?
- A) LGV has been eradicated in the United States but still has significant prevalence and incidence in Southeast Asia and Central America.
  - B) This disease is not common in the United States, but existing cases disproportionately affect women.
  - C) Men who have sex with men are at particular risk of LGV.
  - D) The virus that causes LGV is rare outside the tropics.

Ans: C

**Feedback:**

In the United States, men who have sex with men are the population with the highest prevalence and incidence of LGV. It is bacterial in etiology and affects more men than women.

8. Which of the following factors are known to contribute to vaginal yeast infections?  
Select all that apply.

- A) Inflammation of the Skene and Bartholin glands.
- B) Poorly controlled diabetes
- C) Recent antibiotic therapy
- D) Excessive physical exercise
- E) Use of oral contraceptives
- F) High hormone levels during pregnancy

Ans: B, C, E, F

**Feedback:**

Reported risk factors for the overgrowth of *C. albicans* include recent antibiotic therapy, which suppresses the normal protective bacterial flora; high hormone levels owing to pregnancy or the use of oral contraceptives, which cause an increase in vaginal glycogen stores; and uncontrolled diabetes mellitus or HIV infection, because they compromise the immune system. Exercise and glandular inflammation are not noted risk factors for yeast infections.

9. A patient with a yeast infection asks the nurse how they diagnose this infection. The nurse will base her response knowing this is primarily diagnosed by

- A) the look and smell of the secretions.
- B) looking at the spores on a wet-mount slide using 20% potassium hydroxide.
- C) looking for *Lactobacillus* species under the microscope.
- D) sending a blood test to lab for DNA testing on the specimen.

Ans: B

**Feedback:**

Accurate diagnosis is made by identification of budding yeast filaments or spores on a wet-mount slide using 20% potassium hydroxide. When the wet-mount technique is negative but the clinical manifestations are suggestive of candidiasis, a culture may be necessary. Definite diagnosis consists of more than a visual look at the secretions. Diagnosis of bacterial vaginosis is made by looking at the number of *Lactobacillus* species under the microscope. DNA testing may be required when dealing with HSV infection.

10. A 24-year-old female presents with vulvar pruritus accompanied by irritation, pain on urination, erythema, and an odorless, thick, acid vaginal discharge. She denies sexual activity during the last 6 months. Her records show that she has diabetes mellitus and uses oral contraceptives. Which category of antimicrobial medication is most likely to clear her symptoms?

A) Clotrimazole, an antifungal agent  
B) Penicillin V potassium, a broad-spectrum antibiotic  
C) Ciprofloxacin, a fluoroquinolone antibiotic  
D) Tenofovir, an antiviral agent

Ans: A

**Feedback:**

The character of the discharge and the lack of recent sexual activity suggest infection with *Candida*, which can exist asymptotically and flare up only if conditions such as an imbalance in normal vaginal flora resulting from antibiotic treatment, diabetes, or oral contraceptive use enable the fungus to proliferate. Candidiasis responds well to treatment with azole antifungal agents.

11. A young woman presents with vaginal itching and irritation of recent onset. Her labia are swollen, and she has a frothy yellowish discharge with an unpleasant smell and a pH of 6.8. She has been celibate during the last 6 months and has been taking antibiotics for a throat infection. Which medication is most likely to clear her symptoms?

A) Azithromycin  
B) Valacyclovir  
C) Penicillin  
D) Metronidazole

Ans: D

**Feedback:**

The character of the discharge, lack of recent sexual activity, and current antibiotic treatment point to infection with *Trichomonas vaginalis*, which can exist asymptotically and flare up only if conditions such as an imbalance in normal vaginal flora resulting from antibiotic treatment enable the protozoan to proliferate. Patients with trichomoniasis respond well to treatment with metronidazole.

12. A 24-year-old woman has presented to an inner city free clinic because of the copious, foul vaginal discharge that she has had in recent days. Microscopy has confirmed the presence of *Trichomonas vaginalis*. What are the woman's most likely treatment and prognosis?
- A) Abstinence will be required until the infection resolves, since treatments do not yet have proven efficacy.
  - B) Oral antiprotozoals to the patient and sexual partners to help prevent complications.
  - C) Antifungal medications are effective against the anovulation and risk of HIV that accompany the infection.
  - D) Vaginal suppositories and topical ointments can provide symptom relief but cannot eradicate the microorganism.

Ans: B

**Feedback:**

The treatment of choice for *Trichomonas vaginalis* is oral, metronidazole or tinidazole, medications that are effective against anaerobic protozoans. Antifungals are not a relevant treatment, and eradication of the infection is possible with treatment.

13. A 40-year-old woman with gray, runny vaginal discharge that has a foul, fishy odor has been told that she most likely has vaginosis. Which of the following phenomena most likely contributed to her present condition?
- A) Unprotected sex with a new partner who is a carrier of the relevant bacteria.
  - B) Autoinoculation from a cold sore, wart, or oral fungal infection.
  - C) A sharp reduction in the number of lactobacilli in the client's vaginal flora.
  - D) Proliferation of sexually transmitted protozoa.

Ans: C

**Feedback:**

Vaginosis is a disorder characterized by a shift in the vaginal flora from one dominated by hydrogen peroxide-producing *Lactobacillus* to one with greatly reduced numbers of *Lactobacillus* species and an overgrowth of other organisms. Autoinoculation or sexual transmission of bacteria or protozoa is unlikely to contribute.

14. A 20-year-old male has been diagnosed with a chlamydial infection, and his primary care provider is performing teaching in an effort to prevent the client from infecting others in the future. Which of the following statements by the client demonstrates the best understanding of his health problem?
- A) "Either me or a partner could end up with an eye infection from chlamydia that could make us blind."
  - B) "Even though I couldn't end up sterile, a woman that I give it to certainly could."
  - C) "Each of the three stages of the disease seems to be worse than the previous one."
  - D) "Even if I spread it to someone else, there's a good chance she won't have any symptoms or know she has it."

Ans: D

**Feedback:**

Seventy-five percent of woman with chlamydial infections are asymptomatic. Blindness is a rare complication in adults who live in industrialized countries, and both men and women can become sterile from the effects. Syphilis, not chlamydial infections, has a course of three distinct stages.

15. The health nurse is dealing with a case of untreated chlamydial infection. The nurse suspects the patient has developed Reiter syndrome. Which of the following clinical manifestations would support this diagnosis? Select all that apply.
- A) Diffuse pinkness of the conjunctiva along with watery and itchy eyes
  - B) Asymmetric complaints of stiffness and pain in knees and sacroiliac joints
  - C) Cervical tissue very friable and bleeds easily
  - D) Pain when urinating
  - E) Fatigue and tiredness from heart valve vegetation

Ans: A, B, D

**Feedback:**

The most serious complication of untreated chlamydial infection is the development of Reiter syndrome. This triad of symptoms includes urethritis, conjunctivitis, and arthritis of weight-bearing joints, such as the knees and sacroiliac and vertebral joints. Pain when urinating occurs in both men and women and is associated with urethritis. Women can also develop reactive arthritis, but the male-to-female ratio for this complication is 5:1. The arthritis begins 1 to 3 weeks after the onset of chlamydial infection. The joint involvement is asymmetric, with multiple affected joints and a predilection of the lower extremities. Cervical tissue friability is not part of Reiter syndrome.



16. While working in a sexually transmitted disease (STD) clinic, the nurse should be aware that which of the following diagnostic tools are available for diagnosing chlamydial infections? Select all that apply.

- A) Gram stain where polymorphonuclear leukocytes are identified
- B) Direct fluorescent antibody testing
- C) Enzyme-linked immunosorbent assay (ELISA)
- D) Western blot testing
- E) Nucleic acid amplification tests (NAATs)

Ans: A, B, C, E

**Feedback:**

Diagnosis of chlamydial infections takes several forms. The identification of polymorphonuclear leukocytes on Gram stain of penile discharge in the man or cervical discharge in the woman provides presumptive evidence. The direct fluorescent antibody test and enzyme-linked immunosorbent assay that use antibodies against an antigen in the *Chlamydia* cell wall are rapid tests that are highly sensitive and specific. Nucleic acid amplification tests (NAATs) do not require viable organisms for detection and can produce a positive signal from as little as a single copy of the target DNA or RNA. Western blot is used to verify HIV after a positive ELISA result for HIV.

17. A 55-year-old male has presented to the emergency department because he is alarmed at the genitourinary symptoms he has experienced over the last several days. He reveals that he has had a number of new sexual relationships during a tropical vacation that ended 5 days ago. Over the last several days, he has had increasing pain in his urethra and a creamy yellow discharge from his penis. For the last 2 days, the discharge has been occasionally blood tinged. What differential diagnosis would be the care team's first priority?

- A) Chancroid
- B) Syphilis
- C) Chlamydia
- D) Gonorrhea

Ans: D

**Feedback:**

The rapid onset and bloody penile discharge that the client cites are characteristics of gonorrhea. Neither the onset nor the symptomatology matches syphilis or chancroid, and *Chlamydia* typically takes longer to manifest and does not normally include bloody discharge.

18. In a busy STD clinic on a large university campus, a group of students have developed tetracycline- and penicillin-resistant strains of *N. gonorrhoeae*. Given these results, the nurse can expect that which of the following medications will be prescribed?

- A) Single injection of Rocephin (ceftriaxone)
- B) A 7-day supply of Augmentin (amoxicillin and clavulanate)
- C) Nizoral (ketoconazole), an antifungal medication
- D) Fluconazole (Diflucan), for yeast infections

Ans: A

**Feedback:**

The current treatment recommendation to combat tetracycline- and penicillin-resistant strains of *N. gonorrhoeae* is ceftriaxone in a single injection; the other medications are not specific for the treatment of gonorrhea.

19. A pregnant teenager has arrived at a free clinic seeking care. She has had no prenatal care and is currently 27 weeks' gestation. Upon testing for a sexually transmitted disease (STD), it is found that she has active *T. pallidum* (syphilis). Given the fact that she has active syphilis at this stage in her pregnancy, it is very likely her fetus is at risk for:

Select all that apply.

- A) being born prematurely.
- B) congenital defects.
- C) unstable blood glucose levels.
- D) cyanosis in limbs after delivery.
- E) blindness.

Ans: A, B

**Feedback:**

There is rapid transplacental transmission of the organism from the mother to the fetus after 16 weeks' gestation, so that active infection in the mother during pregnancy can produce congenital syphilis in the fetus. Untreated syphilis can cause prematurity, stillbirth, and congenital defects and active infection in the infant. Unstable blood glucose levels can occur with diabetic mothers, and many infants have some acrocyanosis immediately following birth. Blindness from syphilis can occur decades after initial infection, so it would not be present at birth.

20. Unbeknownst to him, a 30-year-old male has contracted *Treponema pallidum* during a sexual encounter the night before. Place the following manifestations of the microorganism in the chronological order that they would occur in the absence of treatment. Use all the options.

- A) Formation of aneurysms
- B) Appearance of a rash on the man's palms and feet
- C) Development of painless chancres on the man's scrotum.
- D) Latency

Ans: C, B, D, A

**Feedback:**

The primary stage of syphilis includes chancre formation, while the secondary stage often involves a rash on the palms and feet. Latency occurs between the second and third stages, the latter often including cardiovascular effect such as aneurysm formation.

## Chapter 47- Structure and Function of the Musculoskeletal System

1. Which of the following individuals demonstrates a health problem with his or her axial skeleton?
- A) A 21-year-old male who fractured his humerus while snowboarding.
  - B) A 40-year-old man who has a contusion to the left temporal bone of his skull following a motor vehicle accident.
  - C) A 79-year-old female who has undergone hemiarthroplasty (hip replacement surgery).
  - D) A 30-year-old pregnant woman who has a separated pubic symphysis.

Ans: B

**Feedback:**

The skull is considered to be a part of the axial skeleton, while the arm, hips, and pelvis are components of the appendicular skeleton.

2. Which of the following characteristics most accurately applies to compact (cortical) bone?
- A) It is found along lines of stress in the body.
  - B) The bone is arranged in an interwoven, lattice-like pattern.
  - C) It is relatively light but still strong.
  - D) The surface of the bone is lined with osteogenic cells.

Ans: A

**Feedback:**

Due to its rigidity and strength, compact bone is placed along lines of high stress in the body. Spongy bone exists in a lattice-like pattern that is lined with osteogenic cells and is relatively light compared with compact bone.

3. While reviewing the bones in anatomy class, the instructor discusses this type of bone that protects the underlying structures. A good example of a flat bone is:
- A) metatarsal bones.
  - B) vertebrae.
  - C) femur.
  - D) skull.

Ans: D

**Feedback:**

Flat bones are composed of a layer of cancellous bone between two layers of compact bone. They are found in areas such as the skull and rib cage, where extensive protection of underlying structures is needed, or as in the scapula, where a broad surface for muscle attachment must be provided. Vertebrae are irregular bones, while the metatarsal bones and the femur are long bones.

4. While explaining to the parents of a 5-year-old why the child's fractured femur has so much swelling and bruising, the nurse will include which of the following statements?
- A) "Your child fell out of the tree with so much force that the body is trying to send extra fluid to the area of the break."
  - B) "All bone fractures have lots of bruising so it's nothing to worry about."
  - C) "This bone is hollowed out, and the inside of the shaft produces marrow where red blood cells are formed."
  - D) "There are a lot of cartilage attaching to the shaft of the femur, so when you break that bone, it ruptures the cartilage and causes more swelling."

Ans: C

**Feedback:**

Long bones usually are narrow in the mid-portion and broad at the ends so that the weight they bear can be distributed over a wider surface. The shaft of a long bone is formed mainly of compact bone roughly hollowed out to form a marrow-filled medullary canal. The edema and bruising following femur fracture are due primarily to disruption of the shaft of the bone. Cartilage attaches at the end of long bones, not the shaft.

5. During pathophysiology class, a nursing student asks the faculty what purpose do the osteoprogenitor cells serve. From the following list, identify the purpose of these cells. Select all that apply.
- A) Formation of red blood cells
  - B) Growth and remodeling of bone
  - C) Anchorage point for blood vessels
  - D) Repair of bone
  - E) Supply nerves to the bone matrix

Ans: B, D

**Feedback:**

The endosteum is the membrane that lines the spaces of spongy bone, the marrow cavities, and the haversian canals of compact bone. It is composed mainly of osteoprogenitor cells that contribute to the growth and remodeling of bone and are necessary for bone repair. The *osteons* consist of concentric lamellae of the bone matrix, surrounding a central canal, called the *Haversian* canal that contains blood vessels and supply nerves to the bone matrix. The periosteum acts as an anchorage point for blood vessels to enter and leave the bone. RBC formation occurs in the shaft of long bones.

6. A 30-year-old woman has just given birth to a boy. How will the mother's bone marrow differ from that of her son?
- A) Her bone marrow performs additional functions for the maintenance of homeostasis that her son is not able to yet perform.
  - B) The son will have a greater proportion of adipose tissue in his bone marrow.
  - C) Proportionately, the infant will have more red marrow and less yellow marrow than his mother.
  - D) The amount of yellow marrow in the son's bones will decrease as he develops.

Ans: C

**Feedback:**

At birth, nearly all of the marrow is red and hematopoietically active. As the need for red blood cell production decreases during postnatal growth, red marrow is gradually replaced with yellow bone marrow in most of the bones.

7. While studying bones in pathophysiology class, the nursing students learn that the Haversian canals are composed of
- A) calcium salts.
  - B) collagen.
  - C) lymphatics.
  - D) glycosaminoglycans.

Ans: C

**Feedback:**

Haversian canals are spaces in the bone of the cortex that move parallel through the long axis of the bone for a short distance and then branch and communicate with other, similar canals. Each canal carries one or two blood vessels, lymphatics, and some nerve fibers.

8. Bone is connective tissue, in which the intercellular matrix has been impregnated with inorganic calcium salts, that has great tensile and compressible strength but is light enough to be moved by coordinate muscle contractions. One third of the dry weight of bone is composed of which of the following?
- A) Bone cells, inorganic salts, and blood vessels
  - B) Hydroxyapatite, calcium carbonate, and calcium fluoride
  - C) Bone cells, blood vessels, and nerves
  - D) Organic matter and inorganic salts

Ans: C

**Feedback:**

The intercellular matrix is composed of two types of substances: organic matter and inorganic salts. The organic matter (bone cells, blood vessels, and nerves) constitutes approximately one third of the dry weight of bone; the inorganic salts (including hydroxyapatite, calcium carbonate, and calcium fluoride) make up the other two thirds.

9. Which of the following patients would the nurse expect to find woven bone scaffolding in place to facilitate healing? Select all that apply.
- A) A 14-year-old patient recovering from a head injury following a diving accident
  - B) A 22-year-old patient recovering from an auto accident where he incurred a fracture of his femur
  - C) An 85-year-old nursing home patient who is undergoing rehabilitation therapy for the arthritis in his knee
  - D) A 55-year-old prostate cancer patient undergoing radiation therapy for bone metastasis

Ans: B, D

**Feedback:**

Woven bone, often referred to as bundle bone, is deposited more rapidly than lamellar bone. It is of low tensile strength, serving as temporary scaffolding for support. It is found in developing fetus, in areas surrounding tumors and infections, and as part of a healing fracture.

10. Following a fall 4 weeks prior that was caused by orthostatic hypotension, an 83-year-old male has fractured his femoral head. His care provider has stated that the healing process is occurring at a reasonable pace and that the man will regain full function after healing and rehabilitation. Which of the following cells is most responsible for restoring the integrity of the man's broken bone?
- A) Osteocyte
  - B) Osteoclast
  - C) Osteoblast
  - D) Osteoma

Ans: C

**Feedback:**

The osteoblasts, or bone-building cells, are responsible for the formation of the bone matrix and would participate in the healing process. Osteocytes are mature bone cells, while osteoclasts reabsorb bone cells. An osteoma is a bone tumor.

11. Which of the following endocrine functions are responsible for increased resorption of bone that results in a reduction of the number and function of osteoclasts? Select all that apply.

- A) Calcitonin secretion
- B) Decrease in estrogen levels
- C) Stimulation of excess thyroid hormone
- D) Release of catecholamines
- E) Increase movement of calcium and phosphate from bone into the extracellular fluid

Ans: A, B

**Feedback:**

Parathyroid hormone increases the number of resorptive function of the osteoclasts. Calcitonin is thought to reduce the number and resorptive function of the osteoclasts. Estrogen also reduces the number and function of the osteoclasts. Thus, the decrease in estrogen levels that occurs at menopause results in increased resorption of bone. Release of catecholamines has no influence over osteoclast function. Increased movement of calcium and phosphate from bone into extracellular fluid is regulated by parathyroid hormone.

12. Which of the following individuals who has recently presented to a hospital emergency department is displaying an injury that involves his or her fibrocartilage?

- A) A 7-year-old girl whose ear has been lacerated during a dog attack
- B) A 24-year-old male who has had his trachea crushed in a workplace accident
- C) A 15-year-old boy who has suffered a knee injury during a football game
- D) A 78-year-old man who has fallen and is suspected of having a “slipped disc” in his back

Ans: D

**Feedback:**

Intervertebral discs are constructed of fibrocartilage, while the ear is largely constructed of elastic cartilage. Cartilage of the respiratory system and joints is most often hyaline cartilage.



13. While reviewing the role of the parathyroid hormone in the balance of calcium and phosphate levels, the nursing faculty will emphasize that the kidney responds to parathyroid stimulation by
- A) increasing reabsorption of sodium in the distal tubules.
  - B) reducing the reabsorption of phosphate.
  - C) stimulating production of red blood cells.
  - D) decreasing the reabsorption of calcium.

Ans: B

**Feedback:**

In the kidney, PTH stimulates tubular reabsorption of calcium while reducing the reabsorption of phosphate. The latter effect ensures that increased release of phosphate from bone during mobilization of calcium does not produce an elevation in serum phosphate levels.

14. An 80-year-old female with a diagnosis of osteoporosis receives daily supplements of calcitonin in the form of a nasal spray that she instills each morning. Which of the following phenomenon would her care providers expect to result from her supplementation?
- A) Decreased serum calcium levels
  - B) Increased bone resorption
  - C) Acceleration of osteoclast action
  - D) An increase in bone formation

Ans: A

**Feedback:**

Calcitonin lowers both the rate of bone resorption and serum calcium levels. It does not accelerate osteoclast action, and it is not noted to increase bone formation.

15. A 70-year-old woman's family physician has recommended a vitamin D supplement. The woman states that she tries hard to take as few pills as possible and questions her physician on the rationale and necessity of the hormone. How can the physician most accurately reply to the client's concerns?
- A) "Vitamin D can prevent osteoporosis by increasing the density of your bones."
  - B) "Vitamin D is important in order for your body to absorb the calcium that you consume in your diet."
  - C) "When your liver is unable to produce enough on its own, it's important to take vitamin D supplements to promote bone strength."
  - D) "Vitamin D slows down the rate that your body breaks down your bones."

Ans: B

**Feedback:**

Vitamin D facilitates intestinal absorption of calcium. It does not directly increase bone density, and the liver does not independently produce vitamin D. Vitamin D does not decrease the rate of bone resorption.

16. In which of the following locations would a clinician expect to find a ligament?

- A) At the attachment points between ribs and the sternum
- B) Between the radius bone of the arm and the biceps brachii muscle
- C) Around the capsule that forms the knee joint
- D) Between the individual plates of the skull

Ans: C

**Feedback:**

Ligaments exist where a bone connects to its articulating mate, as in the case of the synovial joint between the tibia and femur that constitutes the knee. Ligaments do not connect the ribs to the sternum, and the radius and biceps are connected by a tendon. The interfaces between the skull plates are considered joints, but these are not ligaments.

17. Which of the following is the best example of a diarthrodial joint?

- A) The interface between the body of the femur and the epiphyseal plates at the ends of the bone
- B) The interphalangeal joint between the proximal and middle phalanges of the fingers
- C) The suture between the frontal and parietal bones of the skull
- D) The syndesmoses between the two sides of the pelvis

Ans: B

**Feedback:**

Interphalangeal joints are examples of diarthrodial, or synovial joints, which are characterized by free movement. The joints at epiphyseal plates, between skull bones, and at the symphysis pubis do not meet this criterion.

18. A 71-year-old male with a suspected diagnosis of osteoarthritis is being scheduled for a knee aspiration. The client is surprised to learn that his knee joint contains fluid and asks the physician ordering the procedure what the main role of the fluid is. Which of the following statements best underlies the explanation that the physician will provide?

- A) Synovial fluid allows for joint movement by minimizing friction.
- B) Fluid in the synovial cavities is essential for its role in immunity, and deficits indicate autoimmune etiologies.
- C) Synovial fluid allows for the diffusion of gases and nutrients to cartilage that lacks blood supply.
- D) The fluid inhibits clot formation in bone surfaces that are in constant contact.

Ans: A

**Feedback:**

Synovial fluid is responsible for lubrication. It does not perform a role in immunity or coagulation. While some diffusion takes place between the synovial fluid and adjacent structures, this is not the primary role.

19. Laparoscopic knee surgery in a 22-year-old basketball player has necessitated entry into the synovial cavity. The surgeon performing the procedure would be aware of which of the following relevant characteristics of synovial tissue?
- A) Synovial tissue has a slow rate of healing compared to muscle tissue.
  - B) Damage to synovial tissue is known to be excruciatingly painful.
  - C) The synovial membrane lacks direct blood supply, precluding bleeding into the joint.
  - D) Few pain receptors are located in the synovial membrane.

Ans: D

**Feedback:**

The synovial membrane is innervated only by autonomic fibers that control blood flow. It is relatively free of pain fibers. Synovial tissue heals relatively quickly, and it receives a blood supply.

20. A female tennis player has suffered an injury to her shoulder that has affected her bursae in the joint. Which of the following consequences would be most expected from this aspect of her injury?
- A) Increased friction on the tendons of the shoulder joint
  - B) Direct contact between the humerus and scapula bones
  - C) Loss of connection between the humerus bone and biceps muscle.
  - D) Fusing of the head of the humerus with the glenoid capsule of the scapula.

Ans: A

**Feedback:**

The primary role of bursae is the reduction of friction on tendons. Damage to the bursae would not result in bone-to-bone contact, fusing of the joint, or separation between normally connected muscle and bone.

## Chapter 48- Disorders of Musculoskeletal Function

1. While being tackled, a 20-year-old football player puts out his hand to break his fall to the ground. Because the intense pain in his wrist did not subside by the end of the game, he was brought to an emergency department where diagnostic imaging indicated an incomplete tear of the ligament surrounding his wrist joint. At the time of admission, his wrist was swollen with a severely restricted range of motion. What will his care team most likely tell the player about his diagnosis and treatment?
- A) "This strain will likely resolve itself with sufficient rest."
  - B) "You've suffered a severe sprain, and you might need a cast."
  - C) "Your wrist contusion will have to be observed for bleeding under the skin surface."
  - D) "It looks like a mild to moderate sprain, and you'll need to keep it immobilized for a few weeks."

Ans: D

**Feedback:**

Damage to the ligament structures is associated with sprains, and an incomplete tear would be indicative of a mild to moderate (grade 1 or 2) sprain. A strain is associated most commonly with overuse, and severe sprain would involve total disruption of the ligament.

2. A 41-year-old woman has been diagnosed as having a loose body of cartilage in her left knee. What data would most likely lead clinicians to this conclusion?
- A) A visible hematoma is present on the anterior portion of the knee.
  - B) The woman experiences intermittent, painful locking of her joint.
  - C) Computed tomography indicates a complete tear of her knee ligament.
  - D) An x-ray shows that her femoral head and tibia are no longer articulated.

Ans: B

**Feedback:**

The symptoms of loose bodies are painful catching and locking of the joint. The loose body repeatedly gets caught in the crevice of a joint, pinching the underlying healthy cartilage. A tear of her ligament, a hematoma, or a lack of articulation is not as closely associated with the presence of loose bodies in a joint.

3. A 22-year-old woman has sustained a lateral blow to her right knee during a game, and subsequent imaging has confirmed a severe meniscus injury. Which of the following consequences should the woman expect over the course of recovery? Select all that apply.

- A) Decreased lubrication in the knee joint
- B) Decreased stability of the knee
- C) Reduced shock absorption capacity
- D) Presence of infectious microorganisms in the synovial capsule
- E) Rapid restoration of the cartilage cells in the meniscus

Ans: A, B, C

**Feedback:**

Meniscal injuries have consequences for the lubricating and shock absorption capacities of the meniscus and would involve decreased range of motion. An infectious process is unlikely due to the internal nature of meniscal injuries, and healing is typically very slow.

4. The nurse knows that which of the following patients listed below is at high risk for developing a hip fracture?

- A) A 77-year-old male who runs marathons and maintains a BMI of 25.
- B) An 82-year-old female with macular degeneration and uses a walker to go to the bathroom.
- C) A 64-year-old male with uncontrolled diabetes and chronic kidney disease on dialysis.
- D) A 73-year-old nursing home patient with long-term continence issues but able to walk the hallways for exercise.

Ans: B

**Feedback:**

Hip fracture is a major public health problem in the Western world. The incidence of hip fractures increases with age. The incidence is also higher in white women compared with nonwhite women. Risk factors for hip fracture include low BMI, tall body structure, use of benzodiazepines, lack of exercise, previous injury to lower body extremity, vision problems, and confusion.

5. A public health nurse is conducting a health promotion teaching session at a seniors' drop-in center. Which of the following teaching points about hip fractures in older adults is most justified?
- A) "Current treatment options for hip fractures in older adults mean that surgery is no longer a common necessity."
  - B) "Because of their generally higher body mass, men are particularly susceptible to breaking a hip in a fall."
  - C) "Most hip fractures are actually a break at the very top of the thigh bone."
  - D) "Because bone density is largely determined by your genes, there's little you can do to prevent hip fractures other than avoiding falls."

Ans: C

**Feedback:**

Fractures to the femoral head are the most common etiology of hip fractures in the older adult. Surgery is commonly required, and incidence is higher in women than in men. There are numerous risk factors for hip fracture beyond genetic factors, many of which are modifiable.

6. Which of the following recent admissions to an emergency department is most likely to be diagnosed with a greenstick fracture?
- A) A 20-year-old football player who had an opposing player fall laterally on his leg
  - B) An 8-year-old boy who fell out of a tree and on to his arm
  - C) An 81-year-old woman with a history of osteoporosis who stumbled and fell on her hip
  - D) A 32-year-old woman who fell awkwardly on her arm while skiing

Ans: B

**Feedback:**

A greenstick fracture is seen almost exclusively in children under age 10.

7. The parents of an active 9-year-old are leaving the emergency department (ED) following cast placement for their son's lower extremity as a result of a fall in soccer. The nurse should emphasize that assessment of the cast is important and that they should bring their son back to the ED if they note which of the following signs and symptoms? Select all that apply.
- A) Cold, pale toes on the side with the cast.
  - B) Patient complaining of tingling and numbness in the casted leg.
  - C) Swelling in the lower leg has remained the same since they left the ED 12 hours ago.
  - D) Pulses are palpable below the level of the cast.
  - E) Bruising noted in the lower foot and toes.

Ans: A, B

**Feedback:**

If the circulation becomes inadequate (on a casted extremity), the parts that are exposed at the distal end of the cast (*i.e.*, the toes with a leg cast and the fingers with an arm cast) usually become cold and cyanotic or pale. An increase in pain may occur initially, followed by paresthesia (tingling or abnormal sensation) or anesthesia as the sensory neurons that supply the area are affected. There is a decrease in amplitude of the pulse in areas where the arteries can be palpated. Bruising in the lower foot and toes would be considered normal following this type of fracture. Blood tends to pull in the lower tissues.

8. A nurse is providing care for a client who has had a cast applied to her fractured arm 6 hours prior. The client is now complaining of severe pain that she describes as "even worse than when I broke my arm." What would be the nurse's best course of action?
- A) Administration of analgesics and teaching the client about the normal course of pain after a fracture
  - B) Teaching the client simple range of motion exercises to promote circulation and perfusion
  - C) Taking the client's temperature due to the possibility of infection
  - D) Assessment of motor and sensory function with the goal of identifying compartment syndrome

Ans: D

**Feedback:**

Severe pain in the site of a fracture that is out of proportion to the original injury is a hallmark of compartment syndrome. Assessment of sensory and motor function would be an appropriate first action. Analgesia alone and exercises would be insufficient to diagnose or address compartment syndrome, and infection would be an unlikely etiology of sudden pain after cast application.

9. Following a motorcycle accident that resulted in bilateral femoral fractures, a 42-year-old male has been receiving skeletal traction for the past 8 days. His care providers would recognize that which of the following risks is paramount?

- A) Risk of thromboemboli
- B) Risk of compartment syndrome
- C) Risk of permanent muscle atrophy
- D) Risk of decreased bone density and increased future fracture risk

Ans: A

**Feedback:**

For individuals with lower limb injuries, there is a high risk of venous thromboemboli. Compartment syndrome normally manifests within 64 hours of injury, and muscle atrophy is not likely to be permanent. His injury and recovery are not likely to result in long-standing decreased bone density.

10. A patient has been admitted with a fractured pelvis that occurred in an auto accident just a few hours ago. The nurse notices a slight change in behavior. Which of the following clinical manifestations would lead the nurse to suspect that the patient has fat emboli that has migrated? Select all that apply.

- A) Complaints of substernal chest pain
- B) Complaints of pain in the lower abdomen and back
- C) Pulse rate 120 with temperature of 99.7°F
- D) Profuse diaphoresis with pallor noted
- E) Urine output of 30 mL/hour

Ans: A, C, D

**Feedback:**

Initial symptoms of FES are a subtle change in behavior and signs of disorientation resulting from emboli in the cerebral circulation combined with respiratory depression. There may be complaints of substernal chest pain and dyspnea accompanied by tachycardia and low-grade fever. Diaphoresis, pallor, and cyanosis become evident as respiratory function deteriorates. It would be expected that the patient have lower abdominal and back pain since they have a pelvic fracture. The normal urine output is a minimum of 30 mL/hour.



11. Following prosthetic joint replacement of the knee, the patient continues to complain of pain and discomfort above what would be expected. There is poor incisional healing. The clinic nurse is concerned when she sees that the incision is still draining after 3 weeks post-op. The nurse suspects a prosthetic joint infection. The nurse should anticipate the physician will prescribe
- A) complete bed rest with immobilization of the knee.
  - B) high doses of nonsteroidal anti-inflammatory drugs.
  - C) antimicrobial treatment depending on the microbe.
  - D) wound irrigations with hydrogen peroxide twice daily.

Ans: C

**Feedback:**

Treatment includes the use of antibiotics and selective use of surgical interventions. Antimicrobial agents are usually used prophylactically in persons undergoing bone surgery. For persons with osteomyelitis, early antimicrobial treatment, before there is extensive destruction of bone, produces the best results. Bed rest is not encouraged. The patient may be given NSAIDs for pain, but usually he or she will require a more potent pain killer. Wound irrigations are usually performed in OR rather than at bedside for infected prosthetic joints.

12. A 56-year-old male is obese and has poorly controlled type 2 diabetes mellitus. The home care nurse who changes the dressing on his chronic foot ulcer three times weekly has noted that the client's bone is now visible in the wound bed. The client has a fever and has not complained of any notable increase in pain to his foot. Which of the following statements best captures what is likely occurring?
- A) The client is possibly experiencing direct penetration osteomyelitis in which microorganisms have entered through his foot wound.
  - B) Infectious microorganisms in his blood supply have proliferated in the distal portions of his skeletal system.
  - C) Vascular insufficiency has contributed to infection in both soft tissue and now his bone.
  - D) His immunocompromised status associated with diabetes has allowed skin flora to penetrate his foot bone via the surface wound.

Ans: C

**Feedback:**

Diabetes is strongly associated with vascular insufficiency; this process is more likely than infection from the bloodstream, and his situation is not indicative of direct penetration osteomyelitis. Decreased immune status is not directly responsible for his problem.

13. Which of the following individuals is likely to have the highest risk of developing tuberculosis osteomyelitis?
- A) A 55-year-old female who is in renal failure secondary to poorly controlled type 1 diabetes
  - B) A 79-year-old man who is immunocompromised following a bone marrow transplant
  - C) A 30-year-old man who has undergone open reduction and internal fixation of his fractured tibia
  - D) A 68-year-old woman who had a laminectomy 4 days prior for treatment of her chronic back pain

Ans: B

**Feedback:**

Older age and immunocompromised status are noted risk factors for the development of tuberculosis osteomyelitis. Postsurgical status and diabetes are not noted to be strongly associated with the pathology.

14. A patient asks the nurse why his hip fracture (head of the femur) bone has died (osteonecrosis). The nurse responds based on which of the following pathophysiological principles?
- A) All fractured bones interrupt blood supply and thereby results in death of the bone no matter where it is located.
  - B) Most of the time when the head of the femur breaks, the entire neck region is disconnected to the rest of the bone so the blood vessels are severed.
  - C) Since the head of the femur has only limited collateral circulation, interruption in the blood flow from the fracture causes necrosis and irreversible damage.
  - D) When the femur head breaks, it dislocates and crushes the surrounding area causing the blood vessels to be occluded.

Ans: C

**Feedback:**

Bone has a rich blood supply that varies from site to site. The flow in the medullary portion of bone originates in nutrient vessels from an interconnecting plexus that supplies the marrow, trabecular bone, and endosteal half of the cortex. Some bony sites, such as the head of the femur, have only limited collateral circulation, so that interruption of the flow, such as with a hip fracture, can cause necrosis of a substantial portion of medullary and cortical bone and irreversible damage. Not all fractures interrupt blood supply to the bone. It is not common for the entire head of the femur to break off leaving the area with no blood supply.

15. A 51-year-old male with a history of hypertension has received a kidney transplant. The client's physician is explaining some of the consequences of the procedure, including the fact that he will need to be on long-term steroid therapy. Which of the following teaching points should the physician emphasize?

A) "One of the risks that these steroids bring is the possibility that part of a bone might die."  
B) "Steroids will help your body to not reject your new kidney, but they bring a risk of bone infection."  
C) "You're going to have to avoid contact sports because the steroids will make your bones very susceptible to breakage."  
D) "If you notice sudden limb pain after taking your steroid pills, it could be an increase in pressure in the compartment around your muscles."

Ans: A

**Feedback:**

Osteonecrosis is strongly associated with steroid therapy. Osteomyelitis, decreased bone density, and compartment syndrome are not associated with steroid therapy.

16. A 35-year-old woman who has been in recovery from alcoholism for 2 years presents at her primary care physician's office with chronic hip pain. She reports that as part of her commitment to her recovery, she began exercising regularly about a year earlier. After a month or two, her hip began to hurt when she ran on the treadmill. She stretches, has had a physical trainer check her form to ensure that it is correct, and rests adequately between each workout. Six months ago, the pain began waking her at night, and now it is constant. She is not aware of any injury to her hip and has no other outward symptoms. Which of the following is most likely to be the cause of her pain?

A) Hematogenous osteomyelitis  
B) Osteomyelitis with vascular insufficiency  
C) Tuberculosis of the bone  
D) Osteonecrosis

Ans: D

**Feedback:**

The symptoms associated with osteonecrosis are varied and depend on the extent of infarction. Typically, subchondral infarcts cause chronic pain that is initially associated with activity, but that gradually becomes more progressive until it is experienced at rest. Osteonecrosis is a common complicating disorder of Legg-Calvé-Perthes disease, slipped capital epiphysis, sickle cell disease, steroid therapy, alcohol abuse, and hip trauma, fracture, or surgery. In adults, hematogenous osteomyelitis is seen most commonly in debilitated patients; in those with a history of chronic skin infections, chronic urinary tract infections, and intravenous drug use; and in those who are immunologically suppressed. Osteomyelitis with vascular insufficiency is characterized by local cellulitis with inflammation and necrosis. Local symptoms of tuberculosis of the bone include pain, immobility, and muscle atrophy; joint swelling, mild fever, and leukocytosis also may occur.

17. When trying to explain to a patient diagnosed with a benign bone tumor, the nurse should emphasize the fact that benign tumors primarily
- A) grow rapidly and can spread to the surrounding tissue.
  - B) cause growth of other tumors as they spread their cancer cells into the bloodstream.
  - C) tend to grow very slowly without destroying the supporting tissue.
  - D) occur as a result of tumors in other areas of the body metastasizing into the bone.

Ans: C

**Feedback:**

Benign tumors, such as osteochondromas, tend to grow rather slowly and usually do not destroy the supporting or surrounding tissue or spread to other parts of the body (metastasize). Malignant tumors tend to grow rapidly, destroy supporting or surrounding tissue, or spread to other parts of the body through the bloodstream or lymphatics.

18. A 13-year-old girl and her father come in to the local health clinic hoping to see an orthopedic doctor about the girl's stiff and warm knee. The father reports that she hurt it sliding into base during a softball game, and the daughter concurs, but with further discussion, it becomes clear that the slide made an existing pain worse. Her knee had been stiff, warm, and shiny and had been keeping her awake at night for a week or so before the game. Which of the following might be the cause of the girl's symptoms?
- A) Osteosarcoma
  - B) Osteoma
  - C) Chondroma
  - D) Osteochondroma

Ans: A

**Feedback:**

Osteosarcoma is the most common bone tumor in children and the third most common cancer in children and adolescents; they most commonly arise in the vicinity of knee. The primary clinical feature of osteosarcoma is deep localized pain with nighttime awakening and swelling in the affected bone. Because the pain is often of sudden onset, patients and their families often associate the symptoms with recent trauma. The skin overlying the tumor may be warm, shiny, and stretched, with prominent superficial veins. The range of motion of the adjacent joint may be restricted. The four most common types of benign bone tumors are osteoma, chondroma, osteochondroma, and giant cell tumor; pain is a feature common to almost all malignant tumors but may or may not occur with benign tumors; pain that persists at night and is not relieved by rest suggests malignancy.

19. A 17-year-old male has been diagnosed with osteosarcoma of the upper tibia following several months of leg pain. Which of the following statements by the client demonstrates that he has an accurate understanding of his diagnosis?
- A) "I guess it's good that at least my tumor's a benign type."
  - B) "I'm really nervous about having to get surgery and chemo."
  - C) "I'm gaining hope from the fact that it's really rare for someone to die from this."
  - D) "It still feels surreal that I'm going to have to get my leg amputated."

Ans: B

**Feedback:**

Osteosarcomas are malignant bone tumors that are treatable by surgery and chemotherapy. Survival is in the range of 55% to 70%, so death is not uncommon. Amputation is sometimes necessary but is certainly not an inevitability.

20. A 56-year-old female with a diagnosis of breast cancer has developed bone metastases, which her oncologist would like to treat with radiation therapy. What is her physician's most likely primary goal in the treatment plan of the metastases?
- A) Thorough elimination of neoplastic cells in the bone structure
  - B) Preservation of normal weight bearing and range of motion
  - C) Ensuring vascular supply to the bone is not affected
  - D) Prevention of pathologic fractures

Ans: D

**Feedback:**

While care providers would certainly try to maintain blood supply and mobility, the primary goal in the treatment of bone metastases is to prevent pathologic fractures. Complete elimination of neoplastic cells is not commonly attainable with radiation treatment.

1. Which of the following is an aspect of the bone growth and development that occurs during the first two decades of life?
  - A) Most bone abnormalities can be traced to anomalies in the embryonic stage of development.
  - B) The physiological effects of in utero positioning normally remain into late adolescence.
  - C) Cartilage cells at the metaphyseal end of the bone plate are replaced by bone cells.
  - D) Bone length increases through childhood, while bone diameter remains static.

Ans: C

**Feedback:**

During development, the mature and enlarged cartilage cells at the metaphyseal end of the plate become metabolically inactive and are replaced by bone cells. This process allows bone growth to proceed without changing the shape of the bone or causing disruption of the articular cartilage. Abnormalities linked to the embryonic stage of development are uncommon, and the physiological effects of in utero positioning resolve by 3 to 4 years. Both length and diameter of bones increase during development.

2. A female toddler has been diagnosed with toeing-in (metatarsus adductus). What teaching should the pediatrician provide to the parents of the child about her diagnosis?
  - A) "She will likely walk later than most children, but it will resolve itself with time."
  - B) "We'll likely need to start putting the first of a series of casts on her legs quite soon."
  - C) "The best time to perform the surgery that's needed will be at age 3 or 4."
  - D) "While there's no effective treatment for her toeing-in, most children learn to accommodate the problem and walk independently."

Ans: B

**Feedback:**

Toeing-in, regardless of staging, requires some form of intervention, most commonly braces or casts. Treatment is not noted to include surgery, and spontaneous resolution is not common.

3. When a 4-year-old boy stands erect with his medial malleoli touching, the distance between his knees is 2 inches. What is the child's most likely diagnosis and treatment?
  - A) Genu varum, which can be treated by bracing
  - B) Flatfoot, which will require orthopedic shoes
  - C) Genu valgum necessitating a series of surgeries
  - D) Femoral torsion, which will spontaneously resolve before puberty

Ans: A

**Feedback:**

Genu varum, or bowlegs, can be treated by bracing. The child's stance is not indicative of flatfoot, genu valgum, or femoral torsion.

4. Following genetic testing and a thorough history from the child's mother and father, a 5-month-old boy has been diagnosed with osteogenesis imperfecta. What teaching point should the care team provide to the mother and father?
- A) "His skeleton is prone to breakage, and we'll begin hormone therapy to treat this."
  - B) "His hips are extremely susceptible to dislocation, so rough play is out of the question."
  - C) "You'll need to commit to calcium supplementation for the duration of his development."
  - D) "You'll need to be very careful to avoid causing fractures to his fragile bones."

Ans: D

**Feedback:**

There is no definitive treatment for correction of the defective collagen synthesis that is characteristic of osteogenesis imperfecta, and prevention and treatment of fractures are important. Hip dislocation is not a common manifestation, and neither hormone therapy nor calcium supplements are useful in treatment.

5. Which of the following newborn infants demonstrates the highest risk of presenting with developmental dysplasia of the hip (DDH)?
- A) A girl who was born with toeing-in and who was in a breech presentation
  - B) A twin girl who required resuscitation after delivery
  - C) A boy who was born by caesarian section to a 44-year-old first-time mother
  - D) A boy with Down syndrome who was exposed to cocaine in utero

Ans: A

**Feedback:**

Female sex, a history of breech presentation, and congenital skeletal abnormalities are all correlated with DDH. Respiratory emergencies, delivery by caesarian section, advanced age of the mother, Down syndrome, and drug exposure are not noted risk factors for DDH.

6. While an infant is in the supine position with both knees flexed, the clinician applies gentle downward pressure to both knees, and the knee and thigh are abducted as an upward and medial pressure is applied to the proximal thigh. This examination technique, used to screen for a reducible dislocation, is called
- A) Galeazzi test.
  - B) Ortolani maneuver.
  - C) clubfoot test.
  - D) Trendelenburg test.

Ans: B

**Feedback:**

The Ortolani maneuver is a described test for a reducible dislocation. The Galeazzi test is a measurement of the length of the femurs that is done by comparing the height at the knees while they are flexed at 90 degrees. Trendelenburg test is used for an older child.

7. The parents of a newborn who has been diagnosed with developmental dysplasia of the hip ask the nurse about the reason this harness has to be on their child. The nurse responds,
- A) "This harness allows your baby some mobility as it slowly brings the leg back into abduction."
  - B) "The harness is meant to help the baby be moved without increasing his pain."
  - C) "The harness will keep the leg immobile and force the femoral head back into the cup-shaped socket of the hip bone."
  - D) "Infants with dysplasia of the hip need to keep the leg still, and this harness will provide the immobility needed for healing postsurgery."

Ans: A

**Feedback:**

The Pavlik harness is used on newborns (up to 6 months) to maintain the femoral head in the acetabulum. The harness allows the child more mobility as the leg is slowly and gently brought into abduction.

8. Following bone density scanning and diagnostic imaging, a 4-year-old boy has been diagnosed with Legg-Calvé-Perthes disease. Which of the following findings, signs, and symptoms would lead clinicians to this conclusion? Select all that apply.
- A) The boy has significant difficulty in walking.
  - B) The boy's feet toe-in when standing upright.
  - C) The child has limited abduction of the affected hip.
  - D) His femoral head region is noted to be necrotic.
  - E) There are numerous microfractures where his patellar tendon and tibia articulate.

Ans: A, C, D

**Feedback:**

Pain and difficulty in walking commonly accompany Legg-Calvé-Perthes disease, in which necrosis exists in the epiphyseal growth center of the femoral head. Toe-in would not be an expected related finding, and microfractures where the patellar tendon and tibia articulate are associated with Osgood-Schlatter disease.



9. Child/parents are coming into the physician's office to get the results of some diagnostic testing relating to his knee pain and unusual stiffness and fatigue. The physician suspects the child may have slipped capital femoral epiphysis. The nurse should anticipate that the treatment will involve: Select all that apply.

A) no weight bearing on the femur.  
B) bed rest.  
C) traction.  
D) injection of steroids into the joint.  
E) high dose of calcium supplements.

Ans: A, B, C

**Feedback:**

Early treatment is imperative to prevent lifelong crippling. In situ fixation is recommended. Avoidance of weight bearing on the femur and bed rest are essential parts of the treatment. Traction or gentle manipulation under anesthesia is used to reduce the slip. Surgical insertion of pins to keep the femoral neck and head of the femur aligned is a common method of treatment for children with moderate or severe slips. High dose of calcium supplements will not correct this problem.

10. A public health nurse has learned that a colleague has been screening for scoliosis during visits made to schools even though such screening is not mandated. How should the nurse best respond to the colleague?

A) "The potentially harmful outcomes of screening have been shown to outweigh the benefits."  
B) "Screening for scoliosis has been proven to be inaccurate."  
C) "Screening is unnecessary now that we know scoliosis is a benign condition."  
D) "The low prevalence and incidence of scoliosis have made screening unnecessary."

Ans: A

**Feedback:**

The U.S. Preventative Services Task Force recommends against the routine screening of asymptomatic adolescents for idiopathic scoliosis indicating that the potential harms from screening include unnecessary follow-up visits and evaluations due to false-positive results and psychological adverse effects, especially related to brace wear. Screening is not necessarily inaccurate, and scoliosis is not necessarily benign. The incidence and prevalence remain high.

11. While measuring the height of a 12-year-old girl during an office visit, the primary care physician noted a deviation of the girl's spine. This was subsequently quantified as being a right curve scoliosis of approximately 10-degree deviation. Which of the following treatment options is most clearly indicated?

A) Use of a Milwaukee brace during waking hours  
B) Surgical correction of the girl's spine  
C) Observation and no active treatment  
D) Use of external rods to correct the deviation

Ans: C

**Feedback:**

For persons with lesser degrees of curvature (10 to 20 degrees), the trend has been away from aggressive treatment of scoliosis and toward a “wait-and-see” approach, taking advantage of the more sophisticated diagnostic methods that now are available. The use of surgery or braces is not indicated with a 10-degree curvature.

12. When explaining to a class of nursing students the effects of dysregulation of the RANKL/RANK/OPG pathway, the instructor emphasizes that this plays a prominent role in the pathogenesis of: Select all that apply.

A) osteomalacia.  
B) neoplasia of the bone.  
C) osteoporosis.  
D) genu varum.  
E) bone necrosis.

Ans: B, C

**Feedback:**

It is now believed that dysregulation of the RANKL/RANK/OPG pathway plays a prominent role in the pathogenesis of bone diseases such as neoplasia and bone lesions as well as osteoporosis. Avascular necrosis is known as bone necrosis (death) due to interruption to the blood supply of the bone.

13. Which of the following clients is most likely to have low bone density?

A) A 70-year-old woman with increased numbers of osteoblasts.  
B) A 78-year-old female whose osteoclast function is inhibited.  
C) A 65-year-old male who is noted to have osteopenia.  
D) A 68-year-old male who takes vitamin D supplements.

Ans: C

**Feedback:**

Osteopenia is characterized by a reduction in bone mass greater than expected for age, race, or sex that occurs because of a decrease in bone formation, inadequate bone mineralization, or excessive bone deossification. Increases in osteoblasts, inhibition of osteoclasts, and vitamin D supplementation would all be associated with high bone density.

14. A 74-year-old female has been diagnosed with osteoporosis after her bone density scan indicated osteopenia. Which of the following factors would her care team be most likely to rule out as contributors to her health problem?
- A) The woman is an African American and was exposed to asbestos in her work.
  - B) She has been a heavy drinker for her whole adult life and has diabetes mellitus.
  - C) The client takes corticosteroids for treatment of her long-standing osteoarthritis.
  - D) The woman has an estrogen deficiency and has never undergone hormone therapy.

Ans: A

**Feedback:**

African American race is not a risk factor for the development of osteoporosis, and African Americans tend to have higher bone density than Whites and Hispanics. Asbestos exposure is not a noted risk factor for osteoporosis, while alcohol use, diabetes, steroids, and estrogen deficiency are all risk factors.

15. A nurse is teaching a wellness group among a group of older adult women. One of the women has asked for advice about preventing osteoporosis, which affects many of her friends. What is the nurse's best response to the woman's query?
- A) "Osteoporosis has been shown to have a strong genetic basis, so there is little you can do to prevent it."
  - B) "Weight-bearing exercise is helpful, as are calcium supplements."
  - C) "If possible, scaling back your hormone replacement therapy will reduce your osteoporosis risk."
  - D) "There are drugs called glucocorticoids that both prevent osteoporosis and treat it if you do develop it."

Ans: B

**Feedback:**

Exercise and calcium supplementation have been shown to reduce the incidence of osteoporosis. Use of steroids is a risk factor, and estrogen deficiency would contribute to, rather than preventing, osteoporosis. There is a genetic component to the disease, but this does not preclude prevention efforts.

16. The osteoporosis patient asks the nurse to explain what a bisphosphonate medication does. The nurse will respond,
- A) "This medication helps prevent bone resorption, which will help prevent fractures."
  - B) "These drugs increase your phosphorus levels and thereby help with your calcium levels as well."
  - C) "This medication stimulates your parathyroid gland to increase osteoclastic activity."
  - D) "This medication plays an important role in bone remodeling."

Ans: A

**Feedback:**

Bisphosphonates are effective inhibitors of bone resorption and the most effective agents for the prevention and treatment of osteoporosis. The bisphosphonates bind to hydroxyapatite and prevent bone resorption by inhibiting osteoclast activity. They are effective in reducing the risk of hip, vertebral, and nonvertebral fractures.

17. The infant of a family that has recently immigrated to the United States from South Asia has been diagnosed with rickets. Bone density scanning would yield which of the following characterizations of the infant's bones?
- A) The child's bones are far softer than those of healthy children.
  - B) The infant has bones that are brittle and susceptible to breakage.
  - C) The child's bones lack bone matrix and prevent weight bearing.
  - D) The child's bones are oversized due to insufficient osteoclasts.

Ans: A

**Feedback:**

Rickets is characterized by soft bones that are undermineralized. Bone matrix is not lacking, and the bones tend not to be brittle. Osteoclast deficiency does not underlie rickets.

18. A patient is suspected to have osteomalacia based on his clinical manifestations and lab/diagnostic workup (low calcium levels, transverse lines on x-ray). The nurse would expect the patient to have which of the following clinical manifestations? Select all that apply.

- A) Nerve palsy in upper extremities.
- B) Calcification of aortic valve.
- C) Bone pain.
- D) Muscle weakness.
- E) Cold limb with absent pulses.

Ans: C, D

**Feedback:**

The clinical manifestations of osteomalacia are bone pain, tenderness, and fractures as the disease progresses. In severe cases, muscle weakness often is an early sign. The person is predisposed to pathological fractures in the weakened areas, especially in the distal radius and proximal femur. Cold limb with absent pulses is caused by lack of arterial blood supply to the affected bone.

19. A 16-month-old boy has a normal weight for his age but a height far below the normal range. His list of symptoms includes a protruding abdomen, lethargy, bow legs, muscle weakness, and irritability. His teeth have not yet developed, and he has difficulty standing. What is the child's most likely diagnosis?

- A) Rickets
- B) Rachitic rosary
- C) Paget disease
- D) Developmental dysplasia of the hip

Ans: A

**Feedback:**

All of these are symptoms of rickets that are noticed between 6 months and 3 years of age. The rachitic rosary refers to prominent rib cartilage, which is also a symptom of rickets. Paget disease is a progressive skeletal disorder characterized by increasing structural changes of the long bones, spine, pelvis, and cranium; it usually begins during mid-adulthood. DDH is developmental dysplasia of the hip.

20. A patient comes into the orthopedic clinic complaining of severe pain in his hip that was not caused by a fall. On inspection, the femur and tibia are bowed. There is also a reduced angle of the femoral neck, which gives the patient a “waddling gait” appearance. The doctor suspects Paget disease. The patient asks how he got that. The nurse will respond,

- A) “It's because you don't eat enough calcium-rich foods in your diet.”
- B) “When you were a child you probably broke you hip, and since it wasn't displaced, you continued to walk on it.”
- C) “It might be related to a thyroid condition. We will need to run some more blood work.”
- D) “It's most likely a genetic predisposition. Do you know if anyone else in your family has this problem?”

Ans: D

**Feedback:**

Although the cause of Paget disease remains unclear, there is evidence of both genetic and environmental influences. It has been reported that 15% to 40% of people with the disease have a first-degree relative with Paget disease, and numerous studies have described extended family members with the disease.

## Chapter 50- Disorders of Musculoskeletal Function

1. A 68-year-old woman has had her mobility and quality of life severely affected by rheumatoid arthritis (RA). Place the following pathophysiological events involved in her health problem in the correct order that they most likely occurred. Use all the options.
- A) Inflammatory response
  - B) Interaction between rheumatoid factor (RF) and IgG
  - C) T-cell-mediated immune response
  - D) Pannus invasion
  - E) Destruction of articular cartilage
- Ans: C, B, A, D, E

**Feedback:**

RA is thought to begin with a T-cell-mediated immune response that precipitates interaction between IgG and RF that constitutes an immune response. Pannus invasion is one consequence of this interaction, the ultimate result of which is destruction of cartilage.

2. Following a progressive onset of fatigue, aching, and joint stiffness over the last 2 years, a 69-year-old male has recently been diagnosed with rheumatoid arthritis (RA). Which of the following teaching points should his primary care physician include during the office visit in which this diagnosis is communicated to the client?
- A) "The symptoms you've been experiencing are the result of damage inside your joints, but I'll start you medications that will reverse this damage."
  - B) "It's important that you maximize your level of activity, since decreasing your mobility will worsen the disease."
  - C) "The best treatment plan is to try all other available treatments before resorting to using medications."
  - D) "Steroids and anti-inflammatory drugs that I'll prescribe will likely bring some relief to your symptoms."

Ans: D

**Feedback:**

Current treatment guidelines for RA involve early and aggressive pharmacological treatment, including NSAIDs and corticosteroids. Damage cannot be reversed, and while therapeutic exercise plays a role in treatment, rest is also important.

3. The physician is considering prescribing an anti-tumor necrosis factor (TNF) like infliximab for a rheumatoid arthritis patient. Which of the following statements is accurate about the advantages of using a TNF inhibitor?
- A) "Since TNF inhibitors have few side effects, these drugs will fit well into your regimen."
  - B) "Your disease-modifying antirheumatic drug (DMARD) methotrexate has more cardiovascular side effects than TNF inhibitors."
  - C) "TNF inhibitors help slow the disease progression and improve your ability to perform routine ADL functions."
  - D) "Not only do TNF inhibitors control your disease better but they also will interrupt the inflammatory cascade at several levels."

Ans: C

**Feedback:**

Second-line antirheumatic drugs include anti-TNF drugs such as etanercept, infliximab, and adalimumab. These drugs are biologic response-modifying agents or TNF inhibitors that block TNF- $\alpha$ , one of the key proinflammatory cytokines in RA. Anti-TNF- $\alpha$  agents have shown significant efficacy although they do have some potential adverse side effects. Evidence indicates that CV side effects are not different for TNF inhibitors than for DMARDs. The TNF inhibitor agents also have been shown to inhibit radiologic disease progression and improve functional outcomes.

4. A physician is attempting a differential diagnosis of a 30-year-old female who is suspected of having systemic lupus erythematosus (SLE). Which of the following aspects of the physician's assessment and the client's history would be considered potentially indicative of SLE? Select all that apply.
- A) The client has a "butterfly rash" on her nose and cheeks.
  - B) She complains of intermittent joint pain.
  - C) The woman states that she has numerous environmental allergies.
  - D) The client has been hospitalized twice in the past for pleural effusions.
  - E) Blood work indicates low red cells, white cells, and platelets.

Ans: A, B, D, E

**Feedback:**

A butterfly rash, joint pain, pleural effusion, and low levels of blood cellular components are all associated with SLE. Environmental allergies are not noted to be risk factors or associated symptoms of the disease.



5. A new patient arrives at the clinic. The physician is suspecting that the patient may have systemic lupus erythematosus (SLE) given the clinical manifestations related to joint pain, skin changes, and a history of pleural effusions. The nurse should anticipate which of the following diagnostic test will be a priority to facilitate with the diagnosis?

A) Anti-DNA antibody test  
B) Routine hemoglobin  
C) C-reactive protein  
D) B-cell lymphocytes

Ans: A

**Feedback:**

Ninety-five percent of people with untreated SLE have high ANA levels. However, ANA is not specific for SLE. The anti-DNA antibody test is more specific for the diagnosis of SLE. Hemoglobin may be low if the patient has severe anemia, but it is not specific for SLE. C-reactive protein will show an inflammatory response but again not specific for SLE.

6. A 44-year-old woman who has a long-standing diagnosis of SLE has been able to control her symptoms with lifestyle modifications for several years, but has presented to her care provider due to recent exacerbation. Which of the following pharmacological treatment options is her care provider most likely to rule out first?

A) Nonsteroidal anti-inflammatory drugs  
B) Corticosteroids  
C) Antiplatelet aggregators  
D) Immunosuppressive drugs

Ans: C

**Feedback:**

While NSAIDs, corticosteroids, and immunosuppressives are all noted treatment options for SLE, antiplatelet aggregators are unlikely to address the etiology or signs and symptoms of the disease. A new drug that has shown positive effects in decreasing inflammatory exacerbations for people with SLE is Belimumab, which is a monoclonal antibody that inhibits B-lymphocyte stimulator.

7. A 36-year-old female who has experienced diverse symptoms for several years has finally had her health problems attributed to scleroderma (systemic sclerosis) and has committed herself to learning as much about the disease as she can. Which of her following statements would her nurse want to correct or clarify?
- A) "I'm surprised that in this day and age, they still don't know what causes scleroderma."
  - B) "I suppose this explains why I have such terrible circulation to my hands and feet."
  - C) "I'm scared by the damage that this could cause to my heart and lungs."
  - D) "The worst part of this so far has been learning that there aren't any treatments for scleroderma."

Ans: D

**Feedback:**

While the cause of scleroderma remains unknown, supportive treatments that address symptoms do exist. Reynaud phenomenon is a very common accompaniment to the disease, and cardiac and pulmonary involvement is common.

8. When working with a patient with diffuse scleroderma who is exhibiting a "stone face" expression, the nurse should consider which of the following to be a *priority* nursing diagnosis for this patient?
- A) Ineffective tissue perfusion related to tightening of the facial skin
  - B) Activity intolerance related to muscle tightening in lower extremities
  - C) Oral mucous membrane, impaired due to restricted motion of the mouth
  - D) Aspiration, risk related to swallowing impairments

Ans: D

**Feedback:**

Diffuse scleroderma is characterized by severe and progressive disease of the skin and the early onset of organ involvement. The typical person has a "stone facies" due to tightening of the facial skin with restricted motion of the mouth. Involvement of the esophagus leads to hypomotility and difficulty in swallowing. The other NANDAs would be of lower priority if at all given the assessment data presented.

9. A 16-year-old boy has been diagnosed with ankylosing spondylitis. Which of the following etiologies is responsible for his health problem?
- A) Infection
  - B) Friction between bones
  - C) Immune response
  - D) Inappropriate bone remodeling

Ans: C

**Feedback:**

Ankylosing spondylitis is thought to have an etiology that suggests an immune response. Physical wear and tear, infection, and inappropriate remodeling are not considered primarily responsible for the disease.

10. Which of the following pathophysiological phenomena would be most indicative of ankylosing spondylitis?

- A) Loss of motion in the spinal column and eventual kyphosis
- B) A progressive loss of range of motion in the knee and hip joints
- C) A facial “butterfly rash” and multiorgan involvement
- D) Decreased bone density in long bones

Ans: A

**Feedback:**

The characteristic trait of ankylosing spondylitis is progressive loss of the spinal ROM and eventual kyphosis. Synovial joint involvement is not associated with the disease, and a butterfly rash and multisystem involvement are associated with SLE. Decreased bone density does not normally accompany ankylosing spondylitis.

11. When educating the patient with ankylosing spondylitis, the nurse should emphasize which of the following treatment interventions? Select all that apply.

- A) Encourage sleeping supine on an extra firm mattress if possible.
- B) Prop self up in bed with extra pillows if having respiratory congestion.
- C) Try using the heating pad prior to exercise to help stretching and improve movement.
- D) Wear a knee immobilizer while biking to facilitate ability to exercise for longer periods.
- E) Modify diet to include more protein from red meats and green vegetables for vitamin K.

Ans: A, C

**Feedback:**

Treatment of ankylosing spondylitis is directed at controlling pain and maintaining mobility by suppressing inflammation. Proper posture and position are important. This includes sleeping in a supine position on a firm mattress using one small pillow. Therapeutic exercises are important. Heat applications or a shower or bath may be beneficial before exercise to improve ease of movement. Swimming is an excellent exercise. Immobilizing joints is not recommended. Maintaining ideal weight reduces the stress on weight-bearing joints. However, dietary changes are usually very individualized.

12. Which of the following individuals is most likely to develop a form of reactive arthritis?
- A) A 24-year-old male who completed treatment for a chlamydial infection 1 year ago
  - B) A 46-year-old female who has a long-standing diagnosis of systemic lupus erythematosus
  - C) A 3-year-old girl who was born with a 20-degree congenital scoliosis
  - D) A 79-year-old male who had a total hip replacement 2 months prior

Ans: A

**Feedback:**

Reactive arthritis and Reiter syndrome, in particular, are precipitated by time-distant bacterial infections; *Chlamydia trachomatis* is frequently implicated. SLE, scoliosis, and hip fractures and/or surgery are not noted risk factors for the health problem.

13. While speaking to a senior citizen club about osteoarthritis (OA), which of the following facts are accurate to share? Select all that apply.
- A) By the time you are in your 70s, about 85% of adults will have some form of OA
  - B) Men usually get OA in their hands, whereas women get OA primarily in their hips
  - C) Obesity in women has been correlated to having OA in the knees
  - D) Heredity does not play a significant role in the development of OA

Ans: A, C

**Feedback:**

Eighty-five percent of people with OA are in their 70s. Men are affected more commonly at a younger age. Heredity influences the occurrence of hand OA in the DIP joint. Hand OA is more likely to affect white women, whereas knee OA is more common in black women. Obesity is a particular risk factor for OA of the knee in women.

14. Due to her progressing osteoarthritis (OA), an 80-year-old woman is no longer able to perform her activities of daily living without assistance. Which of the following phenomena most likely underlies the woman's situation?
- A) Inappropriate T-cell-mediated immune responses have resulted in articular cartilage degeneration.
  - B) Loss of articular cartilage and synovitis has resulted from inflammation caused when joint cartilage attempted to repair itself.
  - C) Excessive collagen deposits have accumulated in the woman's synovial joints.
  - D) Bone overgrowth in synovial joints has resulted in fusing of adjacent bones that normally articulate.

Ans: B

**Feedback:**

The joint changes associated with osteoarthritis, which include a progressive loss of articular cartilage and synovitis, result from the inflammation caused when cartilage attempts to repair itself, creating osteophytes or spurs. These changes are accompanied by joint pain, stiffness, limitation of motion, and in some cases by joint instability and deformity. Immune etiology is more associated with rheumatoid arthritis, and collagen deposits are characteristic of scleroderma. Bones do not tend to fuse in the pathogenesis of OA.

15. A 64-year-old man was diagnosed 19 months ago with bilateral osteoarthritis (OA) in his knees, and has come to his family physician for a checkup. The client and his physician are discussing the effects of his health problem and the measures that the man has taken to accommodate and treat his OA in his daily routines. Which of the following statements by the client would necessitate further teaching?
- A) "I'm really trying to lose weight, and I've been able to lose 15 lb this year so far."
  - B) "I've been doing muscle-strengthening exercises twice a week at the community center near my house."
  - C) "Even though I don't like it, I've been using my walker to take some of the weight off my knees."
  - D) "I've been avoiding painkillers because I know they can mask damage that I might be inflicting on my knees."

Ans: D

**Feedback:**

Analgesics are a common and appropriate treatment for OA, and it would be unnecessary and inappropriate to forego pain control in order to maximize pain signals from affected joints. Weight loss, the use of assistive devices, and muscle-strengthening exercises are appropriate treatments for OA.

16. While reviewing the following diagnostic findings on a group of patients with joint complaints, which finding would be a priority for further investigation and possible medical intervention?
- A) A male client has elevated levels of serum uric acid but lacks symptoms.
  - B) Synovial fluid aspiration indicates the presence of monosodium urate crystals.
  - C) A man reveals that he eats organ meat two to three times weekly.
  - D) A 55-year-old male reveals that it takes a day or two for oral colchicines to relieve his attacks of gout.

Ans: B

**Feedback:**

The presence of crystalline deposits in synovial fluid confirms a diagnosis of gout and would necessitate further investigation and/or treatment. Hyperuricemia is not necessarily indicative of gout, and while diet can contribute to gout, this would not necessarily require modification in the absence of gout. Oral colchicine often takes 48 hours to take effect during an acute attack of gout.

17. A male patient in his 50s has just been diagnosed with hyperuricemia. He has had multiple flare-ups of his first metatarsophalangeal joint pain and swelling. The pain is so severe that he cannot sleep with any covers/sheets over his feet at night. The nurse should anticipate that the patient will likely be prescribed: Select all that apply.
- A) Tylenol (acetaminophen) for the pain.
  - B) allopurinol (Zyloprim) to decrease uric acid levels.
  - C) calcium carbonate used to increase the intake of calcium.
  - D) Anturane (sulfipyrazone) to increase excretion of urate.
  - E) sevelamer (Renagel) to reduce the absorption of phosphate.

Ans: B, D

**Feedback:**

Treatment of hyperuricemia is aimed at maintaining normal uric acid levels and is lifelong. One method is to reduce hyperuricemia through the use of allopurinol. Allopurinol inhibits xanthine oxidase, an enzyme needed for the conversion of hypoxanthine to xanthine and xanthine to uric acid as does a newer medication, Febuxostat. The uricosuric drugs (sulfipyrazone) prevent tubular reabsorption of urate and increase its excretion in the urine. NSAIDs, not Tylenol, are usually prescribed for the pain. Calcium does not play a factor in gout. Sevelamer (Renagel), to reduce the absorption of Phosphate, is primarily used in renal failure patients.

18. A 7-year-old boy has been diagnosed with juvenile idiopathic arthritis (JIA), and his parents are anxious to know how his health problem will affect his short-term and longer-term future. What can his health care provider most accurately tell the family?
- A) "Because JIA is an autoimmune disease, the long-term prognosis is quite poor and his mobility is likely to decline over time."
  - B) "The earlier that we can schedule joint replacement surgeries, the better his prognosis will be."
  - C) "With appropriate use of anti-inflammatory drugs along with lifestyle modifications, your son stands a good chance of leading a normal life."
  - D) "We can relieve many of the symptoms of JIA and ensure his mobility, but there is a risk he'll develop a systemic immune response beyond his joints."

Ans: C

**Feedback:**

NSAIDs, biologic response modifiers, and lifestyle modifications allow for a positive prognosis with most cases of JIA. Surgery is not necessarily indicated, and JIA is not noted to precipitate a systemic immune response.

19. An 8-year-old child has just been diagnosed with systemic lupus erythematosus (SLE). The parents wonder what the child's prognosis is going to be. Which of the following findings would be considered a good prognostic indicator of the extent/seriousness of the disease?
- A) Complaints of arthralgias and arthritis in joints with movement
  - B) Ligaments and tendons hurt during passive ROM
  - C) Has a rash on the nose and cheeks
  - D) Swelling in the face and eyes and rust/blood-colored urine

Ans: D

**Feedback:**

The clinical manifestations of SLE in children reflect the extent and severity of systemic involvement. The best prognostic indicator in children is the extent of renal involvement, which is more common and more severe in children than in adults with SLE. Edema and rusty or bloody urine are classic signs of glomerulonephritis. It is expected that people/children with SLE have arthralgias/arthritis in joints, sore ligaments and tendons, as well as integumentary signs and symptoms like a rash on the nose and cheeks (butterfly rash).

20. Although the client's primary care provider has downplayed the symptoms, a geriatrician suspects that an 82-year-old female has polymyalgia rheumatica. Which characteristic symptomatology would most likely have led the specialist to suspect this health problem?
- A) Extended periods of walking cause pain that extends from her ankles, knees, and sciatic nerve.
  - B) The woman complains of aching and morning stiffness in her neck, shoulder, and pelvis.
  - C) Range of motion in the woman's wrists and ankles is greatest in the morning and decreases over the course of a day.
  - D) The woman's metatarsal joints are inflamed and sensitive to touch.

Ans: B

**Feedback:**

Polymyalgia rheumatica is an inflammatory condition of unknown origin characterized by aching and morning stiffness in the cervical regions and shoulder and pelvic girdle areas. Lower limb pain, wrist and ankle stiffness, and pain in the joints of the foot would not be as clearly suggestive of polymyalgia rheumatica.



## Chapter 51- Structure and Function of the Skin

1. After falling off his bicycle, an 8-year-old boy has a large abrasion on his posterior thigh that has removed the epidermis in the region but left the dermis largely intact. Which of the following changes in integumentary system would be expected in the area of his wound?
- A) Profuse bleeding from removal of his epidermis
  - B) Fewer Merkel and Langerhans cells in the region
  - C) Exposure of the underlying subcutaneous tissue
  - D) Removal of hair follicle roots from the area of the wound bed

Ans: B

**Feedback:**

Merkel cells and Langerhans cells are components of the epidermis. Bleeding may be minimal since the epidermis is avascular. Subcutaneous tissue is below the dermis and would not be directly exposed, and hair follicle roots exist at a deeper level than the epidermis.

2. Which of the following statements best conveys an aspect of the process of keratinization?
- A) Keratin cells synthesized in the dermis migrate to the surface over 20 to 30 days.
  - B) Mitosis that begins with the cells of the stratum granulosum results in a continual supply of new keratinocytes.
  - C) The stratum germinativum continuously produces new keratinocytes to replace losses.
  - D) The basal cells of the epidermis migrate to the skin surface at a rate that matches superficial losses of skin cells.

Ans: C

**Feedback:**

The stratum germinativum, or stratum basale, consists of a single layer of basal cells that are attached to the basal lamina. The basal cells, which are columnar, undergo mitosis to produce new keratinocytes that move toward the skin surface to replace cells lost during normal skin shedding. Keratinization does not originate in the dermis or stratum granulosum, and the basal cells of the epidermis do not migrate to the surface.

3. A nurse is teaching a client about the role that skin plays in forming a barrier to environmental agents and microorganisms. The nurse would recognize that which of the following types of cells/junctions are involved in the communication and regulation of the immune response and the secretions of cytokines?

A) Gap junctions  
B) Desmosomes  
C) Adherens junctions  
D) Keratinocytes

Ans: D

**Feedback:**

Keratinocytes are now known to be active secretory cells that play an important role in the immunobiology of the skin by communicating and regulating cells of the immune response and secreting cytokines and inflammatory mediators. Gap junctions allow ions and molecules to pass between skin cells, and adherens junctions provide a mechanical connection between cells. Desmosomes are localized patches or plaques that hold two cells tightly together by proteins called cadherins. They are terminal end points on the cell walls of keratinocytes.

4. While studying the skin in a science class, a student asks why all people have a pinkish color to their lips/mucous membranes. The instructor would respond by citing which of the following responses?

A) Melanocytes are the pigment-synthesizing cells.  
B) Pheomelanin is the yellow to red pigment particularly concentrated in the lips and nipples of humans.  
C) Tyrosinase is responsible for all-colored cell production.  
D) A person with tiny melanocytes will have more concentrated pigment resulting in darker color.

Ans: B

**Feedback:**

Pheomelanin, the yellow to red pigment, is found in all humans. It is particularly concentrated in the lips, nipples, glans penis, and vagina. Melanocytes are pigment-synthesizing cells that are scattered in the basal layer and are responsible for skin color (not mucous membranes). Tyrosinase converts the amino acid tyrosine to a precursor of melanin. If one has a lack of tyrosinase, the end result will be albinism. In dark-skinned people, larger melanin-containing melanosomes are produced and transferred individually to the keratinocyte.

5. A 40-year-old male client has a congenital syndrome that affects the function of the Langerhans cells of his epidermis. The man's care provider would expect which of the following manifestations of his condition?
- A) Increased susceptibility to infection
  - B) High permeability of his epidermis to environmental materials
  - C) Lighter skin tone than other individuals of the same ethnicity
  - D) Frequent separation between the dermal and epidermal layer of his skin

Ans: A

**Feedback:**

Langerhans cells are the immunologic cells responsible for recognizing foreign antigens harmful to the body, and they play an important role in defending the body against foreign antigens. A lack of Langerhans cells would not manifest in increased permeability of the skin, unexpected coloration, or separation between layers.

6. Clinical investigation of a 40-year-old female client with diverse dermatological signs and symptoms has focused on the woman's basement membrane. Which of the following skin functions would a clinician most likely attribute to a region of the integument other than the basement membrane?
- A) Lack of sensory nerve impulse conduction
  - B) Formation of blisters on various skin surfaces
  - C) Lack of adhesion between the dermis and epidermis
  - D) Large immunoglobulin deposits

Ans: A

**Feedback:**

While the basement membrane plays roles in adhering between skin layers and is a common site of immunoglobulin deposition and blister formation, it is not a major site of afferent nerve endings and consequent sensory transmission.

7. A person with severe lymphedema is asking the nurse where specifically are the lymph vessels located in the skin layers. The nurse would respond,
- A) "Basement membrane."
  - B) "Merkel cell layer."
  - C) "Subcutaneous tissue layer."
  - D) "Papillary dermis layer."

Ans: D

**Feedback:**

Dermal papillae contain capillaries, end arterioles, and venules that nourish the epidermal layers of the skin. This layer of the dermis is richly vascularized. Lymph vessels and nerve tissue also are found in this layer. The basement membrane is a layer of intercellular and extracellular matrices that serves as an interface between the dermis and the epidermis. Merkel cells are connected to afferent nerve terminals, forming a Merkel disk. They are believed to be neuroendocrine cells. Subcutaneous tissue consists of fat cells and connective tissues that lend support to the vascular and neural structures.

8. Which of the following components of immune function is absent in the dermis?

- A) Macrophages
- B) T cells
- C) Lymph nodes
- D) Mast cells

Ans: C

**Feedback:**

While macrophages, T cells, fibroblasts, and mast cells are all present in the dermis, lymph nodes are not noted to be present in this layer.

9. The skin is richly supplied with arteriovenous anastomoses in which blood flows directly between an artery and a vein, bypassing the capillary circulation. What is the primary significance of these structures?

- A) They regulate body temperature.
- B) They process sensory information.
- C) They control the formation of “goose bumps”
- D) They combat skin infections.

Ans: A

**Feedback:**

Anastomoses are important for temperature regulation. They can open up, letting blood flow through the skin vessels when there is a need to dissipate body heat, or close off, conserving body heat if the environmental temperature is cold. Although goose bumps are a reaction to cold, they are actually caused by the contraction of the arrector pili muscles.

10. A 51-year-old woman who was born congenitally blind and deaf is able to distinguish individuals by light touch of the individual's face. Which of the following components of the woman's skin innervation likely contributes the most to this ability?

- A) Ruffini corpuscles
- B) Meissner corpuscles
- C) Pacinian corpuscles
- D) Nociceptors

Ans: B

**Feedback:**

Meissner corpuscles are rapidly adapting nerve endings located on the palmar surfaces of the fingers and hands; as such, they would be likely to be involved in fine distinction using the fingers. Ruffini corpuscles are located in the subcutaneous tissue of hairy and glabrous skin, while pacinian corpuscles detect gross pressure and vibration. Nociceptors detect painful stimuli.

11. A frustrated 26-year-old female has sought a referral to a dermatologist in an effort to resolve her sweating and body odor that persists despite good hygiene. Which of the following facts would underlie the explanation that her physician provides about her problem?
- A) Sebaceous secretions vary in both quantity and constituency between individuals.
  - B) Excess production by eccrine sweat glands, combined with bacteria, produces a characteristic odor in moist areas of the body.
  - C) Apocrine sweat glands produce a substance that is more oily than sweat from other sources.
  - D) Occlusion of sebaceous glands in the axillae and groin results in proliferation of microorganisms.

Ans: C

**Feedback:**

Body odor is the result of apocrine sweat gland secretions combining with bacteria to produce a characteristic odor. Neither eccrine sweat glands nor sebaceous glands are primarily involved.

12. Which of the following structures would likely be present in a hair follicle in a man's groin but not in a follicle on his face?
- A) Arrector pili muscle
  - B) Sebaceous gland
  - C) Apocrine gland
  - D) Hair papilla

Ans: C

**Feedback:**

Apocrine glands are only found in hair follicles in the underarms and groin. All hair follicles contain an arrector pili muscle, sebaceous gland, and blood supply in the form of the hair papilla.

13. While working in an allergy clinic, the nurse notices that many patients come in with all types of skin reactions. The nurse working in this area knows that which cells play a role in the development of allergic skin condition?

A) Langerhans cells  
B) Merkel cells  
C) Spherical melanosomes  
D) Keratin

Ans: A

**Feedback:**

Langerhans cells, the antigen-presenting cells of the epidermal skin, not only protect against harmful pathogens but also play an important role in the development of allergic skin conditions. Merkel cells play a role in the neuroendocrine cell function such as neurotransmission for autonomic nerves. Spherical melanosomes are found in people with light skin. Red hair has spherical melanosomes. Keratin is a protein that forms the surface of the skin and is also the structural protein of the hair and nails.

14. A man's primary care physician has characterized his skin lesion as being a temporary eruption but has cautioned him against repeated rubbing or scratching as to avoid lichenization. What is the most likely categorization of the man's skin lesion?

A) A blister  
B) A corn  
C) A callus  
D) A rash

Ans: D

**Feedback:**

A rash is a temporary eruption of the skin that can result in excoriation or lichenization if rubbed or scratched excessively. Corns, calluses, and blisters are not noted to share these characteristics.

15. A child comes in to show his parents (who are nurses) a blister on his foot from “breaking in” a new pair of shoes. The child wants to “pop the blister” to get all the fluid out of it, so it would not hurt so much when he puts on shoes/socks. The parents know that breaking the skin of the blister will put him at risk for
- A) fluid volume deficit.
  - B) further edema due to loss of proteins.
  - C) secondary infection.
  - D) activity intolerance.

Ans: C

**Feedback:**

A blister is a vesicle or fluid-filled papule. They can have a mechanical origin caused by friction from repeated rubbing on a single area of skin. Friction blisters most commonly occur on the palmar and plantar surfaces of the hands and feet where the skin is constantly exposed to mechanical trauma. Breaking the skin of a blister to remove the fluid is inadvisable because of the risk of secondary infection. Fluid volume deficit is highly unlikely with only one blister on the foot. The fluid in the blister is composed of proteins but unlikely to cause a shift in fluids due to only having one blister. The child can continue to be active but usually need a dressing/bandage placed over the blister for comfort.

16. Following exposure to poison oak while camping, a 20-year-old male is experiencing pruritus as a consequence of his immune response to irritants in the plant. What physiological process best accounts for his complaint?
- A) His body is communicating a low-level pain response as a protective measure.
  - B) Free nerve endings are initiating an itch-specific signal to the somatosensory cortex.
  - C) Local irritation of Langerhans cells is sending signals by way of myelinated type C nerve fibers.
  - D) Ruffini corpuscles are transmitting the message of pruritus to the cerebral cortex.

Ans: B

**Feedback:**

It is generally agreed that itch is a sensation that originates in free nerve endings in the skin, is carried by small myelinated type C nerve fibers to the dorsal horn of the spinal cord, and is then transmitted to the somatosensory cortex via the spinothalamic tract. Itching is no longer considered to be a low-level pain response. Ruffini corpuscles and Langerhans cells are not noted to play a role in pruritus.

17. A boy has arrived home after experiencing his first outdoor camping trip with his Boy Scout troupe. Upon arrival at home, he is very uncomfortable and scratching at a rash. It appears that he contacted poison ivy and that it has spread to many areas on his body. The nurse in the clinic will likely prescribe which of the following treatment measures for this child? Select all that apply.

- A) Prescription for corticosteroids.
- B) Cool showers especially right before bedtime.
- C) Over-the-counter antihistamines.
- D) Occlusive ointments with high petroleum content.

Ans: A, B, C

**Feedback:**

Most treatment measures for pruritus are nonspecific. Rubbing using the entire hand helps prevent scratching. Because vasodilation tends to increase itching, cold applications may provide relief. Cool showers before bed may be helpful. Topical corticosteroids may be helpful in some cases. However, systemic antihistamines and corticosteroids may be indicated for people with severe pruritus. Occlusive dressings are thick creams that contain petroleum and can act as a barrier to prevent water loss from the skin. They usually are prescribed for dry skin.

18. An 81-year-old woman has noted a gradual decrease in the moisture of her skin over many years. Which phenomena associated with the aging process are known to contribute to her xerosis? Select all that apply.
- A) Separation of the basement membrane from adjacent dermal and epidermal layers
  - B) Changing composition of sebaceous gland secretions
  - C) Flattening of the dermal rete ridges
  - D) Decreased moisture secretions from sweat glands
  - E) Decrease in skin capillaries

Ans: B, C, D, E

**Feedback:**

The effects of aging on skin dryness include a change in the composition of sebaceous gland secretions and a decrease in the secretion of moisture from the sweat glands. Aging is also accompanied by a decrease in skin capillaries and flattening of the dermal rete ridges resulting in less surface area for exchange of fluids between the dermis, epidermis, and skin surface. Separation of the basement membrane is not noted to be a normal accompaniment to aging.



19. When trying to explain the advantages of using an emollient over other products to a patient suffering from dry skin, the nurse will emphasize emollients
- A) can replenish the oils on the skin surface because they contain fatty acids.
  - B) will draw water out from the deeper skin layers.
  - C) provide moisture-proof material to the skin by providing a thick creamy layer as a barrier.
  - D) will contain some form of numbing agent like lidocaine to help with the itching.

Ans: A

**Feedback:**

Emollients are fatty acid-containing lotions that replenish the oils on the skin surface but usually do not leave a residue on the skin. Humectants are the additives in lotions that draw out the water from the deeper skin layers and hold it on the skin surface. However, the water that is drawn to the skin is transepidermal water, not atmospheric water. Thus, continued evaporation from the skin can actually exacerbate dryness. Occlusive are thick creams that contain petroleum to act as a barrier. Lotions or cream additives include steroids or mild anesthetics, such as camphor, menthol, lidocaine, or benzocaine. These agents work by suppressing itching while moisturizing the skin.

20. Which of the following facts accounts for the variation in skin tone that exists between individuals?
- A) Someone with dark skin has more melanocytes in his or her skin layers.
  - B) Darker-skinned individuals have melanosomes that produce melanin faster.
  - C) Dark skin is associated with spherical melanosomes, which produce and “package” pigment differently.
  - D) Greater numbers of keratinocytes result in darker skin tone.

Ans: B

**Feedback:**

The amount of melanin in the keratinocytes determines a person's skin color. Dark-skinned and light-skinned people have the same amount of melanocytes. However, in dark-skinned people, larger melanosomes are produced and transferred to the keratinocyte individually. In light-skinned people, a number of smaller melanosomes are packaged together in a membrane and then transferred to the keratinocyte. The way the melanosomes are packaged is responsible for the pigmentation in darker-skinned persons. Darker-skinned people do not have more melanocytes than light-skinned people, but the production and packaging of pigment is different.

## Chapter 52- Disorders of Skin Integrity and Function

1. An 18-year-old female of Southeast Asian ancestry is distraught over the recent appearance of white patches on her forearms and upper arms, which have been subsequently confirmed as vitiligo. Which of the following statements by the woman express an accurate understanding of her condition?
- A) "I suppose it's some comfort that my patches are small and will always stay out of sight in the future."
  - B) "I'm thankful that there are medications to cure this, but I'm nervous about the side effects."
  - C) "I suppose this shouldn't come as too much of surprise, since this tends to run in my family."
  - D) "I'm surprised that I ended up contacting that fungus that caused this problem for me."

Ans: C

**Feedback:**

The incidence of vitiligo is thought to have a genetic component. Vitiligo worsens with time, and treatments are not curative. The etiology is not infectious and does not involve fungus.

2. An 11-year-old boy with skin lesions on his trunk characteristic of ringworm has been brought to the family's primary care provider by his mother. Which of the following aspects of the clinician's assessment relates most directly to the suspected diagnosis?
- A) Previous infection with other parasitic worms
  - B) Potential contact with the fungus from pets or other children
  - C) Allergic reactions to drugs and environmental substances
  - D) The child's infant immunization history

Ans: B

**Feedback:**

Ringworm, or tinea, has a fungal etiology. Parasites, allergies, and immunizations would be unlikely to relate directly to the etiology.

3. The father of an 18-month-old girl noticed a small vesicle on her face several days ago. The lesion ruptured and left a straw-colored crust that remained on the girl's face. The eruption of new vesicles has prompted him to bring the child to the emergency department. Which of the following treatments for the child's skin problem is most likely?

A) A topical antifungal ointment  
B) An oral corticosteroid  
C) An antiviral ointment  
D) A topical antibiotic

Ans: D

**Feedback:**

The course and symptomatology of the child's skin disorder is characteristic of impetigo, which is bacterial in etiology and would likely be treated with a topical antibiotic such as mupirocin.

4. An elderly patient has arrived at the physician's office complaining of a rash. Upon further investigation, the patient states that the rash feels like a burning pain but also has some tingling. It is extremely sensitive to touch, and it's "like crazy." The nurse notes that the rash is made up of vesicles and located on the right thoracic region. The nurse suspects the patient has

A) chickenpox.  
B) German measles.  
C) herpes zoster.  
D) human papillomavirus.

Ans: C

**Feedback:**

All of the characteristics point to herpes zoster. The vesicles erupt for 3 to 5 days along the nerve pathway (hence the reason for the burning pain). Eruptions usually are unilateral in the thoracic region, trunk, or face. Rubella (German measles) is characterized by a diffuse, punctuate, macular rash that begins on the trunk and spreads to the arms and legs. Varicella (chickenpox) has a macular stage where it develops within hours over the trunk, spreading to the limbs, mucosa, scalp, axillae, upper respiratory tract, and conjunctiva. HPV causes genital warts and is a sexually transmitted disease.

5. Which of the following teaching points is most appropriate for a teenager who has sought care for the treatment of his severe acne?
- A) "Avoiding high-fat foods and chocolate won't cure your acne, but it will likely improve it a lot."
  - B) "All the creams and ointments that you can buy have been shown to be no real help for acne."
  - C) "It's important for you to vigorously wash your face several times a day."
  - D) "You might need antibiotic pills in addition to a cream for your face."

Ans: D

**Feedback:**

Combination treatments for acne often include a topical preparation in addition to oral antibiotics. Avoiding certain foods has not been shown to be effective in acne treatment or prevention, and the topical products available are effective in some, though not all, cases. Care should be taken not to exacerbate lesions by washing the face too vigorously or too often.

6. A 30-year-old woman, who just found out that she is pregnant, seeks a treatment for her severe acne. What is the most appropriate treatment for her skin condition?
- A) Accutane
  - B) Low-dose tetracycline
  - C) Retin-A
  - D) A benzoyl peroxide agent

Ans: D

**Feedback:**

Benzoyl peroxide is a topical agent that has both antibacterial and comedolytic properties. It is the topical agent most effective in reducing the *P. acnes* population. Bacterial resistance does not develop to benzoyl peroxide. The irritant effect of the drug also causes vasodilation and increased blood flow, which may hasten resolution of the inflammatory lesions. Although Accutane, low-dose tetracycline, and Retin-A are often used to treat severe acne, these drugs should not be given to those who are pregnant because they can affect the development of the fetus.

7. A 31-year-old man who has worked for several years installing fiberglass insulation has developed itchy, irritating lesions on his wrists and forearms over the last several months. He has applied moisturizing creams repeatedly and has taken antihistamines but has experienced no significant improvement. He is understandably concerned about the potential effect this could have on his livelihood and has asked his care provider when treatment will resolve the problem. What is the care provider's most appropriate response?
- A) "A steroid cream will likely help but often the skin problem lasts long after contact with the product that irritates the skin."
  - B) "You're clearly allergic to the fiberglass in your insulation, and over-the-counter allergy medications are likely to resolve the problem quite rapidly."
  - C) "The problem is that your skin is producing and sloughing off cells prematurely; this will respond well to a topical steroid."
  - D) "There are medications I can prescribe that will cure this sensitivity, but they tend to take many months to take full effect."

Ans: A

**Feedback:**

Topical corticosteroids are often used in the treatment of irritant contact dermatitis, but symptoms can persist long after contact with the irritant ceases. The course of the man's complaint is suggestive of irritant, not allergic, contact dermatitis. Hyperkeratinization is characteristic of psoriasis, and a sensitivity can be treated but not cured.

8. A 44-year-old man has been diagnosed with chronic urticaria, the exact cause of which cannot be determined. What is the pharmacological treatment that is most likely to be of most use to the man?
- A) topical retinoids
  - B) epinephrine
  - C) antihistamines
  - D) benzoyl peroxide

Ans: C

**Feedback:**

While epinephrine may be of use during an acute episode of urticaria that affects the upper airway, antihistamines are the most common regular treatment modality.

Retinoids and benzoyl peroxide are used for the treatment of acne.

9. A female client who is suspected of having psoriasis. Which of the following aspects of the woman's history and her care provider's assessment would be potential contributors to her health problem? Select all that apply.
- A) The woman takes an angiotensin-converting enzyme inhibitor for the treatment of hypertension.
  - B) She has been diagnosed with arthritis.
  - C) The woman has a family history of diabetes.
  - D) Skin trauma of any kind often precedes an outbreak.
  - E) The woman has dark skin.

Ans: A, B, D

**Feedback:**

ACE inhibitors, arthritis, and skin trauma are all associated with psoriasis and acute episodes of the problem. Diabetes and dark skin tone are not noted to predispose to the condition.

10. The nurse is caring for a patient in the hospital for pneumonia but also has a severe case of psoriasis that is being treated with methotrexate. During the morning assessments, which of the following lab values would alert the nurse that the patient may be experiencing a side effect to this medication? Select all that apply.
- A) Serum potassium ( $K^+$ ) level 3.6 mmol/L
  - B) Platelet count  $37 \times 10^3/\mu\text{L}$
  - C) Alanine aminotransferase (ALT) 28 units/L
  - D) White blood cell count  $1.2 \times 10^3/\mu\text{L}$

Ans: B, D

**Feedback:**

Methotrexate is an antimetabolite that inhibits DNA synthesis and prevents cell mitosis. Oral methotrexate has been effective in treating psoriasis when other approaches have failed. The side effects include nausea, leukopenia (low WBC count), thrombocytopenia (low platelet count), and liver function abnormalities. The low platelet count corresponds to thrombocytopenia, and the low WBC corresponds to leucopenia. The other lab values,  $K^+$  and ALT, are within the normal adult range.

11. A 13-year-old girl has presented to a clinic with her mother explaining that she had an oval-shaped red patch on her chest a week ago but that more of the lesions are now appearing on her back. On examination, the lesions on her back are in a “Christmas tree” pattern. What is the girl's most likely diagnosis?

A) Lichen planus  
B) Pityriasis rosea  
C) Rosacea  
D) Melasma

Ans: B

**Feedback:**

The characteristic lesion of pityriasis rosea is an oval macule or papule with surrounding erythema. This initial lesion is a solitary lesion called the *herald patch* and is usually on the trunk or neck. As the lesion enlarges and begins to fade away (2 to 10 days), successive crops of lesions appear on the trunk and neck. The lesions on the back have a characteristic “Christmas tree” pattern. The girl's history and symptomatology are not characteristic of lichen planus, rosacea, or melasma.

12. A 22-year-old male who has been backpacking around Southeast Asia for several months has responded well to treatment for scabies that he acquired while on his trip. What follow-up measures should be taken?

A) Continuing his antibiotics until the full course is completed  
B) Treatment of individuals that he has been in close contact with  
C) Applying corticosteroid creams for at least 8 weeks to prevent recurrence  
D) Avoiding potentially irritating products such as dyes and perfumes

Ans: B

**Feedback:**

Treatment of scabies should be extended to individuals with whom the affected person has had close contact. Antibiotics and steroids are not used in treatment of scabies, and irritants are of no particular threat.

13. When trying to discern the extent of a burn, the nurse will note that second-degree full-thickness burns are characterized by

A) extending into the subcutaneous tissue.  
B) noting that blood vessels have clotted and can be seen under the burned skin.  
C) redness or pinkness noted, but no blister formation is present on the epidermis.  
D) extensive pain along with waxy white areas with blister formation.

Ans: D

**Feedback:**

Second-degree full-thickness burns involve the entire epidermis and dermis. These burns have extensive pain because the pain sensors remain intact. These burns appear as mottled pink, red, or waxy white areas with blister formation and edema. Answers A and B relate to third-degree full-thickness burns, whereas answer C is characteristic of first-degree burns.

14. A 17-year-old male experienced third-degree full-thickness burns 2 days ago to his lower limbs after a fire at his workplace. Which of the following complications should his care team foresee and regularly assess for? Select all that apply.

- A) Systemic infection
- B) Fluid volume deficit
- C) Respiratory dysfunction
- D) Hypermetabolic response
- E) Constipation and bowel obstruction

Ans: A, B, C, D, E

**Feedback:**

Sepsis, hemodynamic instability, respiratory dysfunction, hypermetabolism, and bowel obstructions are all demonstrated consequences of thermal injury.

15. A care aide who works in a long-term care facility recognizes the high incidence and prevalence of a stage I pressure ulcer in immobile older adults. Which of the following protocols in the facility would the care aide advocate changing?

- A) Residents with persistently low food intake are identified.
- B) Immobilized residents are turned every 2 hours during both day and night.
- C) Residents are frequently encouraged to increase their fluid intake.
- D) Wound dressings are applied promptly to all identified or potential pressure ulcers.

Ans: D

**Feedback:**

Early-stage pressure ulcers and potential pressure ulcers do not necessitate wound dressings and are better treated by turning, keeping skin dry, and removing pressure. Nutrition and hydration status are important factors, and individuals who cannot reposition themselves independently should be turned regularly.

16. Which of the following clients of an oncologist is likely to have the poorest prognosis?

- A) A 69-year-old man who has been diagnosed with stage IV malignant melanoma
- B) A 70-year-old whose skin cancer has been identified as nodular ulcerative basal cell carcinoma
- C) A 51-year-old woman whose biopsy has revealed intraepidermal squamous cell carcinoma
- D) A 59-year-old woman who has invasive squamous cell carcinoma

Ans: A

**Feedback:**

Late detection of malignant melanoma is associated with particularly poor outcomes. Basal cells carcinomas often have strong treatment success rates. While invasive SCC has worse outcomes than intraepidermal SCC, these are both exceeded in mortality by late-stage malignant melanoma.



17. Which of the following changes in an 86-year-old male's skin would necessitate further examination and possible medical treatment?

- A) A decrease in general sebaceous gland activity
- B) Appearance of new skin tags on his chest
- C) A new mole-like growth on his forearm
- D) Appearance of a keratosis on the man's trunk

Ans: C

**Feedback:**

Appearance of a new mole or a change in the size or shape of an existing mole can be indicative of malignant melanoma. Decreased sebaceous gland secretions, skin tags, and keratoses are normal age-related changes.

18. A nurse practitioner student is trying to distinguish the various rashes they will be seeing in their pediatric rotation. Their nurse preceptor is assisting by describing the rash associated with rubeola. Which of the following characteristics would apply to rubeola? Select all that apply.

- A) Rash is macular and blotchy.
- B) Maculopapular rash covering the trunk and spreading to the appendages.
- C) The rash usually begins on the face and then spreads to the legs/arms.
- D) The rash forms vesicles with depressed centers that are filled with yellow-colored fluid.
- E) The painful rash follows a nerve root usually on only one side of the body.

Ans: A, C

**Feedback:**

Rubeola is highly communicable. The characteristic rash is macular and blotchy. The rash usually begins on the face and then spreads to the legs/arms (appendages). A maculopapular rash covering the trunk and spreading to the appendages is noted in roseola infantum. Varicella begins as a macular stage and then proceeds to the second stage where the rash forms vesicles with depressed centers that are filled with yellow-colored fluid. A painful rash follows a nerve root usually on only one side of the body is usually characteristic of shingles.

19. A few of the more experienced nurses are sitting around a lunch table discussing the changes they are seeing in their skin. Which of the following would be considered normal age-related changes? Select all that apply.

- A) Thickening of the dermis layer.
- B) Reduction in subcutaneous tissue.
- C) Increased hair growth on back and legs.
- D) Dry, scaly skin.

Ans: B, D

**Feedback:**

Normal skin changes associated with aging are seen on areas of the body that have not been exposed to the sun. They include thinning of the dermis and the epidermis, diminution in subcutaneous tissue, a decrease and thickening of blood vessels, and a decrease in the number of melanocytes, Langerhans cells, and Merkel cells. Hair growth is reduced. The skin becomes dry, rough, scaly, and itchy.

20. A patient is showing the nurse some changes in his skin that he found while taking a shower. Which of the following lesions would give the nurse concern that it might be a precancerous lesion? Select all that apply.

- A) Soft, flesh-colored papule located on the neck and “armpit.”
- B) Wart-like, tan-brown lesion that is sharply outlined and a few centimeters in diameter.
- C) Several dry, brown, scaly lesions that are approximately 1 cm in diameter, and a few of the lesions are showing some ulceration.
- D) Tan to brown lesions commonly called “liver spots” are located on the forearm and hands.
- E) Red-colored mark close to the skin surface located on the face.

Ans: C, D

**Feedback:**

Actinic keratoses are the most common premalignant skin lesion that develops on sun-exposed areas. The lesions are often multiple and more easily felt than seen. The lesions are described as dry, brown, and scaly approximately 1 cm in diameter. A few of the lesions may be showing some ulceration. Tan to brown lesions commonly called “liver spots” are located on the forearm and hands. Liver spots are considered risks for the development of skin cancer and should be treated. Keratoses are a horny growth or an abnormal growth of the keratinocytes. A seborrheic keratosis is a benign, sharply circumscribed, wartlike lesion that has a stuck-on appearance. Soft, flesh-colored papule located on the neck, axilla (“armpit”), and intertriginous areas are skin tags. A seborrheic keratosis is a wartlike, tan brown or black lesion that is sharply outlined and a few centimeters in diameter. Strawberry nevus, or hemangioma, is named for its color. This red tinge to your skin comes from a collection of blood vessels close to your skin's surface. While the hemangioma can be anywhere, the most common locations are the face, scalp, back, or chest. It is very common and noncancerous.